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THE

TRANSACTIONS

OF THE

AMERICAN

MEDICAL ASSOCIATION.

INSTITUTED 1847.

VOL. X.

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By a Resolution passed at the Session of 1851, the Committee of Publication were instructed to print conspicuously, at the beginning of the volume of the *Transactions*, the following disclaimer:—

"The American Medical Association, although formally accepting and publishing the Reports of the various Standing Committees, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution."

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MINUTES

OF THE

TENTH ANNUAL MEETING

OF THE

AMERICAN MEDICAL ASSOCIATION,

HELD IN THE CITY OF NASHVILLE, TENN., MAY, 1857.

NASHVILLE, *May* 5, 1857.

THE Association met at 11 o'clock, in the Representative Hall of the State Capitol, the President, Dr. ZINA PITCHER, of Michigan, in the chair, and upon his right Dr. W. K. BOWLING, of Tennessee, one of the Vice Presidents. Dr. WM. BRODIE, of Michigan, and Dr. R. C. FOSTER, of this city, Secretaries, were present.

The meeting having been duly organized, the first business in order was stated by the Chair to be the reception of the Report of the Committee of Arrangements.

Dr. C. K. WINSTON, Chairman of the Committee of Arrangements, on behalf of the Committee and of the Medical Profession of the city generally, extended a sincere and cordial welcome to the members of the Association, in a few pertinent and appropriate remarks, as follows:—

Mr. President and Gentlemen of the American Medical Association: This, I believe, is the Tenth Annual Meeting of this Association. As Chairman of the Committee of Arrangements and Reception, I am charged with the agreeable duty of welcoming you to the State of Tennessee and the city of Nashville. I regret that I have not language to express this sentiment with sufficient cordiality. I only add, gentlemen, in common phrase, "You are more than welcome."

You are the representatives of a profession, distinguished alike for its antiquity, its scientific attainments, and its usefulness. It constitutes the true link between science and philanthropy—science and philanthropy, moral, intellectual, and physical. You come from every portion of this glorious republic—from the Kennebec to the Rio Grande—from orange groves and golden sands—from mountains clad in eternal snow, and valleys smiling in perpetual verdure. You come not for purposes of self-aggrandizement or personal ambition, nor yet to advance the schemes of parties or stir up the antipathies of sections. "You know no North, no South, no East, no West;" but you come as a company of philanthropists, a band of brethren, that you may pour the acquisitions of another year into a common treasury, kneel side by side at a common altar, and drink the living water as it gushes from a common fountain. You have come to maintain the dignity, to elevate the ensign of a profession, to which you have devoted your lives, and to which you have linked your fortunes.

You are the cultivators of a profession eminently progressive, admitting to the fullest extent the spirit and genius of enterprise. So much may not be so fully said of others. Who could expect at this or any other day to embellish the Commentaries of Blackstone, or improve the Pleadings of Chitty, or repoise the scales of justice? Where are the men with commissions never so divine, who would attempt to recast the logic which made Felix tremble, or adorn the doctrine of justification by faith? Who hopes now to shed additional light on the pathway to the skies, or sing in strains more immortal than the triumphs of the cross? Not so with Medicine. Yours is a rising orb, magnificent in its proportions; while others have reached the zenith, yours has but begun to mount the heavens; while others have begun to fade, yours knows no eclipse nor decline. You revere the names of Hippocrates and Sydenham, of Brown and Cullen, with a host of others; you treasure up their maxims, and admire the genius with which they struck out new truths, but you acknowledge no *master*, you fall down at the feet of no *Gamaliel*. You have come to the day of free thought, of free investigation, and free speech. You call in question the most hoary, as well as the most recent fact, and you are daily revealing, in floods of light, principles hid from the foundation of the world.

You are eminently the students of nature. While others may be led along dubious paths by mortal pedagogues, your teacher dwells in the realms of eternal light, and guides with hand unseen and un-

erring to essences and first causes. The formative crystal and germinal dot are alike transparent before you. You are taught the mysteries of the living principle; the scalpel and retort are your companions, while you revel in the wonders of the microscopic world. You understand, somewhat, the laws by which a mote or a mountain is formed, a monad or a man is made. The spear of grass which lifts its head in the distant solitude, the lordly oak and imperial cedar, instruct you; while air, and earth, and sea, with the creeping multitude, yield treasures at your command.

You are the veterans of a thousand battle-fields, not of mortal strife, where man meets man in sanguinary conflict, but where a secret and impalpable foe, a tyrant who has reigned from Adam till now, disposes his secret forces and directs their deadly shafts. When others have turned back affrighted and aghast, you, single-handed and alone, have met "the pestilence which walketh in darkness," and the destruction "which wasteth at noonday," despoiled them of "the armor wherein they trusted," and have driven them ignominious from the field.

Were the victories which you have won, the conquests which you have achieved known, you would be crowned with laurels more unfading than those which entwined the brows of Greek or Roman conquerors.

But more, and better than all, you are the lovers of your race, the friends of humanity. Scattered about all over this happy land, you emphatically "go about doing good." Your hearts beat in unison with human woe; your ears are open to the cry of distress, whether it come from hovel or palace; you "wipe away the orphan's tear, and cause the widow's heart to sing for joy;" upon your heads daily descend "the blessings of those who were ready to perish."

To such a body of men thus actuated, thus coming, we extend a cordial welcome. We feel honored by your presence, and expect to be improved and elevated by your intercourse. We throw wide our doors and invite you to the hospitalities of our homes, and to the kinder affections of our hearts.

Dr. WINSTON then proposed that the roll of delegates, who had registered their names, should be read. The roll having been called, it appeared that twenty States were represented.

Upon the suggestion of Dr. C. K. WINSTON, Drs. FELIX ROBERT-

SON, JOHN SHELBY, and JAMES OVERTON were made permanent members of the Association.

The following list comprises the names of all delegates, permanent members, and members by invitation in attendance during the session:—

NEW HAMPSHIRE.

State Medical Society,	ADONIRAM SMALLEY.

CONNECTICUT.

State Medical Society,	CHAS. HOOKER.

NEW YORK.

Erie County Medical Society,	GEO. N. BURWELL.
Albany Medical College,	ALDEN MARCH.
Med. Society of the City and County of N. Y.,	D. M. REESE.
Col. of Physicians and Surgeons,	SAMUEL ST. JOHN,
Bellevue Hospital,	JAS. R. WOOD.

NEW JERSEY.

State Medical Society,	RICHARD M. COOPER, S. W. BUTLER.

PENNSYLVANIA.

State Medical Society,	B. V. SCHNECK.
Lancaster City and Co. Med. Soc.,	P. CASSIDY.
Jefferson Medical College,	ROBLEY DUNGLISON.
Philadelphia County Med. Society,	CASPAR WISTER.

VIRGINIA.

Member by Invitation,	W. H. PHILLIPS.

NORTH CAROLINA.

Member by Invitation,	P. W. DAVIS.

SOUTH CAROLINA.

State Medical Society,	ROBT. S. BAILEY, M. S. MOORE.
State Medical Association,	ROBT. W. GIBBS.
Collitow District Medical Society,	E. R. HENDERSON.

GEORGIA.

State Medical Society,	PIKE BROWN,
	JESSE BORING,
State Medical Society,	A. H. MEANS,
	N. F. POWERS,
	THOMAS S. POWELL,
	C. R. WALTON.
Savannah Medical College,	RICHARD D. ARNOLD,
	J. GORDON HOWARD.
Oglethorpe Medical College,	J. W. BENSON,
	J. C. LE HARDY.
Medical College of Georgia,	HENRY F. CAMPBELL.
Atlanta Medical College,	J. P. LOGAN.
Atlanta Medical Society,	M. H. OLIVER.
Savannah Hospital,	GEO. P. PADELFORD.

ALABAMA.

State Medical Society,	ABM. F. ALEXANDER,
	W. P. REESE.
State Medical Association,	S. W. CLANTON,
	GEO. M. MERIWEATHER.
Med. Board Northern Dist. of Ala.,	T. STITH MALONE.
Lawrence County Med. Association,	J. WEBB MORRIS.
Southeastern Medical Association,	WM. H. THORNTON,
	P. C. WINN.
Members by Invitation,	W. J. BASS,
	THOS. T. COTNAM,
	JNO. B. COOK,
	J. J. DEMENT,
	W. D. LEFTWICH,
	G. D. NORRIS,
	J. F. SOWELL.

MISSISSIPPI.

State Medical Society,	JNO. T. LOWE.
King's County Hospital, N. Y.,	K. C. DIVINE.
Marshall County Medical Society,	F. B. SHUFORD.
Member by Invitation,	JNO. S. CAIN.

TENNESSEE.

State Medical Society,	B. W. AVENT,

State Medical Society,	A. H. Buchanan, W. K. Bowling, Jno. H. Callender, Walace Estill, R. F. Evans, R. C. Foster, Jno. P. Ford, W. D. Haggard, W. P. Jones, Jno. D. Kelly, Thos. Lipscombe, Jno. H. Morton, S. S. Mayfield, Thos. L. Maddin, Geo. A. J. Mayfield, J. E. Manlove, W. P. Moore, Richard Owen, Jno. D. Winston, P. S. Woodward.
Davidson County Medical Society,	T. A. Atchison, Robert Martin.
Knox County Medical Association,	Jno. M. Boyd.
Hardeman County Med. Society,	J. S. Burford.
Rutherford County Med. Society,	Wm. T. Baskette, H. H. Clayton, M. Ransom.
Tennessee Hospital for the Insane,	H. H. Bethshares, W. A. Cheatham.
East Tennessee Medical Society,	R. O. Currey, B. B. Lenoir, J. A. Long, J. W. McNutt, James Rodgers.
Williamson County Med. Society,	D. B. Cliff, Andrew B. Ewing, Jno. S. Park.
Med. Soc. of the Univ. of Nashville,	W. H. Childress, Jas. W. Hoyte, N. C. Perkins,

Med. Soc. of the Univ. of Nashville,	W. D. SENTER, JNO. M. WATSON.
Giles County Medical Society,	J. P. EPPERSON, R. G. P. WHITE.
State Hospital,	S. L. WHARTON.
Nashville Medical Society,	PAUL F. EVE.
Memphis Medical Society,	GEO. R. GRANT, JOHN MILLINGTON.
Montgomery County Med. Society,	J. L. C. JOHNSTON, H. M. WHITAKER.
Medical Department University of Nashville,	THOS. R. JENNINGS, J. B. LINDSLEY.
Marshall County Med. Society,	THOS. J. KENNEDY.
Sumner County Medical Society,	H. B. MALONE, T. M. WOODSON.
Hamilton Medical Association,	MILO SMITH.
Permanent Members,	IRA CONWELL, JNO. M. LAWRENCE, FRANK A. RAMSEY, CHAS. K. WINSTON.
Members by Invitation,	J. J. ABERNATHY, J. M. BRANNOCK, W. M. CLEMENTS, W. BOND DASHIELL, B. C. JILLSON, JOHN LOGUE, J. C. MURRILL, S. T. MCMURRAY, W. P. STOCKARD, T. B. STROUD, J. F. TOWNES, G. F. SMITH.

LOUISIANA.

N. Orleans School of Medicine,	C. BEARD, E. D. FENNER.
State Medical Association,	ROBERT A. NEW.
Natchitoches Medical Association,	S. O. SCRUGGS.

KENTUCKY.

State Medical Society,	C. P. MATTINGLY, L. G. RAY,

State Medical Society,	J. W. Singleton, D. W. Yandell.
Western Lunatic Asylum,	Samuel Annan.
Warren County Medical Society,	W. A. Atchison, L. C. Porter.
University of Louisville,	R. J. Breckinridge, Josh. B. Flint.
Louisville Medical Club,	S. M. Bemiss.
Eastern Lunatic Asylum,	W. S. Chipley.
Christian County Medical Society,	R. W. Gaines.
Members by Invitation,	L. E. Almon, J. K. Bailey, E. G. Davis, Jno. T. Fleming, B. S. Wood.

OHIO.

State Medical Society,	B. S. Brown, Jas. M. Mosgrove, J. A. McFarland.
Montgomery County Society,	H. F. Koehne.
Hardin County Medical Society,	A. W. Munson.
Member by Invitation,	O. Ferris.

INDIANA.

State Medical Society,	Wm. H. Byford, Talbot Bullard, Calvin West, W. W. Hitt, Nathan Johnson.
Newcastle Medical Society,	Isaac Mendenhall.

ILLINOIS.

State Medical Society,	T. K. Edmiston, Wm. A. Hillis, J. H. Luce, James M. Steele.
McLean Medical Society,	E. K. Crothers.
Galena Medical Society,	J. C. H. Hobbs.
Hancock Medical Association,	Geo. W. Hall.
De Witt Medical Society,	B. S. Lewis.

MICHIGAN.

State Medical Society,	L. H. COBB, LEWIS DAVENPORT, Z. PITCHER.
St. Mary's Hospital,	WM. BRODIE.
University of Michigan,	MOSES GUNN, A. B. PALMER.
Detroit Medical Society,	L. G. ROBINSON.

WISCONSIN.

State Medical Society,	HAYS MCKINLEY.
Milwaukie City Medical Society,	JNO. K. BARTLETT.

IOWA.

Dubuque Medical Society,	ASA HORR, WM. WATSON.
College of Physicians and Surgeons	J. C. HUGHES,
Iowa University,	D. L. MCGUGIN.

MISSOURI.

State Medical Society,	JNO. S. MOORE.
Medical College of Missouri,	E. S. FRAZER.
St. Louis Medical Society,	S. POLLAK.
St. Louis Medical College,	CHAS. A. POPE.

ARKANSAS.

Members by Invitation,	F. W. ARMSTRONG, F. G. MCGAVOCK.

The President then stated that it was customary to take a recess of fifteen minutes, in order that the different State Delegations might appoint a member to serve on the Committee on Nominations, and the Association took a recess accordingly for that purpose.

At the expiration of the recess, the Association was called to order, and the State Delegations then reported their choice respectively of delegates to serve on the Nominating Committee, which was constituted as follows:—

CHAS. HOOKER, Connecticut,	JAS. R. WOOD, New York,
A. SMALLEY, New Hampshire,	A. B. PALMER, Michigan,
W. W. HITT, Indiana,	J. S. MOORE, Missouri,
J. K. BARTLETT, Wisconsin,	T. K. EDMISTON, Illinois,

R. J. BRECKINRIDGE, Kentucky,
F. G. MCGAVOCK, Arkansas,
B. S. BROWN, Ohio,
R. W. GIBBES, South Carolina,
W. P. REESE, Alabama,
F. B. SHUFORD, Mississippi,
R. M. COOPER, New Jersey,
S. O. SCRUGGS, Louisiana,
P. CASSIDY, Pennsylvania,
THOS. S. POWELL, Georgia,
J. B. LINDSLEY, Tennessee,
ASA HORR, Iowa.

On motion of Dr. HOOKER, of Connecticut, it was resolved that the President, Dr. PITCHER, be now requested to deliver his annual address.

After the delivery of the address—

On motion of Dr. FLINT, of Kentucky, the thanks of the Association were tendered to the President for his very able address, and the same was referred to the Committee of Publication.

The Chairman of the Committee of Arrangements announced that the sessions of the Association would be from 9 A. M. to 2 P. M.

JUDGE CATRON, of the U. S. Supreme Court, being present, was invited to a seat on the stand.

The Nominating Committee then retired for the purpose of nominating officers for the ensuing year.

The Report of the Committee of Publication being called for, it was read by Dr. CASPAR WISTER, of Pennsylvania, and, on motion, was accepted and referred to the Committee of Publication.

Dr. WISTER also read his report as Treasurer, which was received and adopted.

On motion of Dr. FLINT, of Kentucky, Dr. R. T. FLEMING, of Kentucky, was admitted as a member of the Association by invitation.

The Committee on Prize Essays being called upon to report, requested further time, because of the late hour at which the essays were handed in, which was granted.

The President informed the Association that Dr. F. CAMPBELL STEWART, of New York, Dr. ALDEN MARCH, of New York, Dr. ISIDORE GLÜCK, of New York, and Dr. JOSEPH PANCOAST, of Pennsylvania, had been appointed to represent this Association in foreign scientific bodies.

The Committee on Medical Education was called, but made no report.*

The Committee on Medical Literature was called—no report.

* Received after the adjournment.

The Committee on Medical Topography and Epidemics being called, a communication from Dr. J. C. WATSON, of Maine, was read, asking for further time to make a report, which was granted.

Dr. ARNOLD, of Georgia, offered the following resolution, which was adopted:—

Resolved, That the Committee on Nominations be constituted a standing committee during the present session of the Association, to which shall be referred all business of the Association on which an immediate vote is not required.

Dr. JAS. MAURAN, of the Committee on Medical Topography and Epidemics for Rhode Island, being called for, the Secretary read his apology, which was accepted.

Dr. PEREGRINE WROTH, of same Committee for Maryland, sent in his report, with accompanying reports of Drs. A. M. WHITE and EDMUND E. WATERS, which were received and referred to the Committee of Publication.

Dr. W. L. SUTTON, of same Committee for Kentucky, sent an apology and asked for further time, which was granted.

The members of the same Committee for the States of New Hampshire, Vermont, Massachusetts, New York, New Jersey, Pennsylvania, Delaware, Virginia, District of Columbia, South Carolina, North Carolina, Tennessee, and Minnesota being called, no reports were made.

The delegates from Connecticut and Louisiana being absent for the time, the consideration of their reports was postponed until to-morrow.

A report from Dr. J. F. POSEY, of Georgia, was presented by Dr. ARNOLD, and subsequently withdrawn by him for the purpose of preparing an abstract of it.

The Committee on Nominations then appeared, and through their Chairman, Dr. J. B. LINDSLEY, reported the following officers of the Association for the ensuing year, viz:—

PRESIDENT,

DR. PAUL F. EVE, *of Tennessee.*

VICE-PRESIDENTS,

R. J. BRECKINRIDGE, *of Kentucky*, W. H. BYFORD, *of Indiana*,
D. M. REESE, *of New York*, HENRY F. CAMPBELL, *of Georgia.*

On motion of Dr. ARNOLD, of Georgia, the report was accepted.

The Chairman stated that the Secretaries would be selected when it is ascertained where the next meeting of the Association will be held.

Dr. WISTER, of Pennsylvania, moved that a committee of three be appointed by the President to conduct the newly elected officers to the chair, which was carried.

The President appointed as such committee, Drs. WISTER, ARNOLD, and MCGUGIN.

The President elect being absent, the Association adjourned to meet at 9 o'clock A. M., to-morrow.

May, 6, 1857.

The Association met pursuant to adjournment. The minutes of yesterday were read and adopted.

The Committee appointed yesterday, Drs. WISTER, ARNOLD, and MCGUGIN, were then requested to conduct the newly elected officers to their respective seats.

Dr. EVE, of Tennessee, in taking the chair, addressed the Association as follows:—

Gentlemen of the American Medical Association: It is with deep emotion that I attempt to return you my heartfelt thanks for this distinguished honor. In elevating one so unworthy of this station, so ill-prepared to preside over your deliberations, or carry out the great designs of this body, I must express the apprehension that you have done yourselves injustice, and, it may be, not advanced its best interests. But, believing that this office should neither be sought nor declined, when tendered as it has been, after my State had declined to take any part in the nomination of a presiding officer, I enter upon the discharge of its onerous duties with much diffidence, and shall have frequent occasion to throw myself upon your considerate indulgence.

We are engaged, gentlemen, in a good and noble work. Life, the greatest of human blessings, and health, the sweetest stimulus to earthly enjoyments, are our end and aim. We live to secure the one and to preserve the other. To promote these all important objects, the medical profession of our country have, during the past twelve years, annually appointed delegates to assemble and counsel how this may be effected. And we are here to-day on one of these great festive occasions, and, amidst our mutual congratulations, these glorious reunions of good-will and fellowship among the brotherhood, must not forget that to us is committed the health and

lives of others. In maintaining the honor and increasing the usefulness of medical science, we become the best contributors to the welfare and happiness of those around us. You have come up hither from the North and from the South, from the East and from the West, and have done well neither to count the cost nor calculate the sacrifice; for the cause in which you are engaged is worthy of you. You present again the sublime spectacle of brethren from all sections of this widely extended Union, congregated to devise the best means to relieve suffering humanity; and may I not add, we are here with

> "Our souls by love together knit,
> Cemented, mixed in one;
> One hope, one heart, one mind, one voice!"

Dr. WINSTON, of Tennessee, read the names of additional delegates to the Association.

Dr. HOOKER, from the Committee on Medical Topography and Epidemics for the State of Connecticut, being called on for his report, arose and explained that it was his understanding that the Committee were to have three years in which to make their report, and at the end of that time he would either be prepared or ask the indulgence of the Association for further time.

The President, under a resolution passed at the last meeting, appointed Drs. CURREY, GRANT, and EVANS a Committee on Voluntary Contributions.

Reports now being in order, the report of Dr. POSEY, of Georgia, was called for; Dr. ARNOLD, of Georgia, read an abstract of the report of Dr. POSEY; all of which, on motion of Dr. PALMER, of Michigan, was referred to the Committee of Publication, under a suspension of the rule.

On motion of Dr. WOOD, of New York, the reports which were presented yesterday were also referred to the Committee of Publication, under a suspension of the rule.

The State of Ohio being called upon for a report upon its Medical Topography and Epidemics, the Secretary read an apology from Dr. G. MENDENHALL, who asked further time in which to make a report, which was granted.

The States of Mississippi, Missouri, Michigan, Illinois, Indiana, Wisconsin, Iowa, California, and the U. S. Navy, being called, no response was made.

A telegraphic dispatch from Dr. J. M. SIMS, of New York, who

was to report on the Treatment of the Results of Obstructed Labor, was received and referred to the appropriate committee.

A communication was received from the Southern Methodist Publishing House, inviting the members of the Association to visit that establishment, which was accepted.

A communication was read by Dr. LINDSLEY, of Tennessee, from the Medical Association of Washington City, inviting the National Association to hold their next annual meeting in that city. On motion, the communication was referred to the Committee on Nominations.

A resolution was offered by Dr. BARTLETT, of Wisconsin, tendering a vote of thanks to the late President, ZINA PITCHER, for the able manner in which he has presided over the deliberations of this body, which was unanimously adopted.

The Reports of Special Committees for 1856–7, being next in order, they were called in order as follows:—

Inflammation—Its Pathology, etc.—Dr. E. R. PEASLEE, Maine. Asked further time. Referred.

Anatomy and Histology of the Cervix Uteri.—Drs. H. HUTCHINSON and CHARLES E. ISAACS, New York. No report.

Treatment of Cholera.—Dr. J. TAYLOR BRADFORD, Kentucky. No report.

Treatment best adapted to each variety of Cataract, etc.—Dr. MARK STEPHENSON, New York. Further time asked. Referred.

Causes of the Impulse of the Heart, etc.—Dr. J. W. CORSON, of New York. A communication was received, and on motion of Dr. BRODIE, he was continued.

Causes of Infant Mortality, etc.—Dr. D. MEREDITH REESE, of New York, read an abstract of his report, which was referred to the Committee of Publication.

The venerable Dr. SHELBY, of Tennessee, being present, was invited to a seat on the stand. His appearance was warmly acknowledged.

Dr. HOBBS, of Illinois, offered the following resolution:—

Resolved, That a Committee on Essays (not including Prize Essays) be appointed, to whom all essays prepared for publication by this Association shall be referred, which Committee shall transfer to the Committee on Publication all essays they judge worth publishing. That said Committee of Essays make a full report of their proceedings to the Association at its next annual session; provided, authors of rejected essays being informed of said rejection by said

Committee, shall have the privilege of withdrawing them from the report of the Committee to the Association.

On motion of Dr. PALMER, of Michigan, the resolution was indefinitely postponed.

The Secretary read the following protest against admitting the delegates from Oglethorpe Medical College:—

NASHVILLE, *May* 6, 1857.

The undersigned, members of the American Medical Association, protest against the admission of delegates from the Oglethorpe Medical College of Savannah, on the ground that it is not a regularly organized college, it being a matter of public notoriety in Savannah, that during neither of the two sessions of its existence have all the chairs been regularly filled. During its first session the chairs of Physiology and Materia Medica were not filled, except by a very few lectures, by the gentlemen appointed to them, and the same thing occurred during its last session as to the chairs of Materia Medica and Chemistry. All of which is respectfully submitted.

RICHARD D. ARNOLD, M. D.
J. GORDON HOWARD, M. D.
PIKE BROWN, M. D.
GEO. P. PADELFORD, M. D.

After several resolutions were offered and some discussion,

On motion of Dr. PALMER, the whole subject was referred to a committee of three to be appointed by the Chair.

Dr. BRODIE, of Michigan, moved as an amendment, that no Faculty Member of a Medical College be appointed upon the committee, which was accepted by the mover.

The Chair appointed as such committee, Drs. WISTER, of Penn., BEMISS, of Ky., and GIBBS, of South Carolina.

Dr. FELIX ROBERTSON, the oldest physician in Tennessee, being present, was invited to a seat on the stand. He was greeted with marked consideration by the Association.

The Committee on Nominations was convened to transact important business.

The calling of Special Committees was resumed:—

Spontaneous Umbilical Hemorrhage, etc.—Dr. J. FOSTER JENKINS, New York. Further time asked. Referred.

Use of Instruments in Obstetrical Practice.—Dr. HENRY CARPENTER, of Pennsylvania. No report.

Measures to be adopted to remedy the Evils existing in the present mode of holding Coroner's Inquests.—Dr. ALEXANDER J. SEMMES, D. C. Report presented, with the following resolution attached:—

Resolved, That committees of three, in each State, Territory, and the District of Columbia, be appointed, and that said committee be, and they are hereby authorized in the name of this Association, to memorialize their respective Legislatures, to pass such laws as will best carry into effect the objects of the foregoing report.

The report was referred to the Committee of Publication, and the accompanying resolution referred to the Committee on Nominations.

True Position and Value of Operative Surgery, etc.—Dr. J. B. FLINT, of Kentucky. Further time asked; granted.

Causes and Cure of Indigestion, etc.—Dr. G. VOLNEY DORSEY, of Ohio. No report.

Medical Jurisprudence of Insanity, etc.—Dr. C. B. COVENTRY, of New York. Further time granted.

Human, Animal, and Vegetable Parasites.—Dr. JOSEPH LEIDY, Pennsylvania. No report.

Value of strict attention to position in the Treatment of Diseases of the Abdomen.—Dr. M. D. DARNALL, Indiana. No report.

Milk Sickness.—Dr. GEORGE SUTTON, Indiana. No report.

Blending and Conversion of the Types of Fever.—Dr. CLARK G. PEASE, Wisconsin. Communication sent, but not received. Postponed.

Best Substitutes of Cinchona, etc.—Dr. B. S. WOODWORTH, Indiana. No report.

Use of Cinchona in Malarious Diseases.—Dr. FRANKLIN HINKLE, Pennsylvania. Report furnished. Referred to Committee of Publication.

Nervous System in Febrile Disease.—Dr. HENRY F. CAMPBELL, Georgia. Verbal abstract of report given. Referred to Committee of Publication.

Laws governing the Absorption and Deposit of Bone.—Dr. JNO. NEILL, Pennsylvania. No report.

Intimate Effects of Certain Toxicological Agents in the Animal Tissues and Fluids.—Dr. JOHN W. GREEN, New York. No report.

Intimate Structure and Pathology of the Kidney.—Dr. CHARLES E. ISAACS, New York. Further time granted.

Diseases Incidental to Emigrants, etc.—Dr. ISRAEL MOSES, New York. No report.

Etiology and Pathology of Epidemic Cholera.—Dr. T. W. GORDON, Ohio. Partial report presented and Committee continued.

Excretions as an Index to the Changes going on in the System.—Dr. H. A. JOHNSON, Illinois. No report.

Remedial Effects of Chloroform.—Dr. D. D. THOMPSON, Kentucky. No report.

Best Method of causing an Increase in the Number of Essays, etc.—Committee: Drs. LEIDY, WOOD, and MEIGS, Pennsylvania. No report. Committee continued.

Changes produced in Composition and Properties of Milk, etc.—Dr. N. S. DAVIS, Illinois. Communication read and further time granted.

Stomatitis Materna.—Dr. MCGUGIN, Iowa. Further time granted.

An abstract of the report of Dr. FENNER, of Louisiana, upon the Medical Topography of that State, was then read and referred.

Dr. SINGLETON, of Kentucky, offered the following resolution, which was unanimously adopted:—

Resolved, That in the death of Dr. GRAFTON, of Mississippi, the American Medical Association has lost a talented and useful member, and society a benefactor.

On motion of Dr. WHITAKER, of Tennessee, Dr. H. RONALDS was expelled from the Association for giving certificate contrary to the rules of the Association.

Dr. CASPAR WISTER, Chairman of the Committee upon the Admission of the Delegates from Oglethorpe Medical College, reported as follows:—

Dr. W. BENSON asserts that for the past session the Oglethorpe school has been fully organized, that six professorships have been regularly filled, and that the occupants of these chairs have been in the constant fulfilment of their duties, except in cases of illness; such instances having, however, at no time interrupted the regular course of lectures, the professor absent having had his place supplied by his colleagues. The seventh chair is admitted to have been vacant; the duties were discharged, however, fully by other members of the faculty.

Dr. R. D. ARNOLD prefers no charges beyond those admitted above.

Therefore, your Committee finding nothing that infringes upon the strict letter of the law of the American Medical Association, in

reference to the admission of members, recommends that all further action in this question be suspended.

CASPAR WISTER,
R. W. GIBBES,
A. M. BEMISS.

The Secretary read the following preamble and resolutions, which were unanimously adopted:—

WHEREAS, It has pleased God to remove by death our fellow-member, ROBERT M. PORTER, and because of his devotion to the interests of the Profession of Medicine, and his steady support of the American Medical Association,

Resolved, That this Association learned with unfeigned sorrow of his decease; and that they have lost a firm and intelligent supporter, and society a benefactor and friend.

Dr. T. BULLARD, of Indiana, offered the following:—

Resolved, That in the death of Dr. JOHN L. MOTHERHEAD, this Association has lost a useful member, and society a benefactor.

The Secretary read a communication from the Connecticut Medical Society, asking that the time for holding the meetings of the Association in northern cities be changed to a later period in the year. Referred over to the next meeting by the Constitution. Adjourned to meet at 9 o'clock A. M., to-morrow.

May 7, 1857.

The Association met pursuant to adjournment. The minutes of yesterday were read and adopted.

Dr. HOYTE, from the Committee of Arrangements, read the names of additional delegates to the Association, who had arrived since the meeting of the Association yesterday.

The Secretary read a communication from Dr. CLARK G. PEASE, of Wisconsin, which accompanied his report on "*Blending and Conversion of the Types of Fever.*"

Dr. HOOKER, of Connecticut, moved that the report be referred to the Committee on Voluntary Contributions.

Dr. MCKINLEY moved to amend by having a portion of the report read, which was lost, and the motion recurring to refer the report, it was carried.

Dr. CURREY, from the Committee on Voluntary Contributions, submitted the following report, which was accepted:—

The Committee on Voluntary Contributions has examined the

following papers, and recommended them for publication in the *Transactions* of the Association:—

1st. A New Principle of Diagnosis in Dislocations of the Shoulder-Joint. By L. A. DUGAS, M. D., Professor of Surgery in the Medical College of Georgia, Augusta; accompanied by four photographic plates illustrating the principle.

2d. Medical Statistics of Washington Territory. By GEORGE SUCKLEY, M. D., U. S. A., embracing 1st, Geological Divisions of the Territory; its Geology, Meteorology, Fauna. 2d, White Population and its Diseases. 3d, Native Population; Diseases; Medical Practice; Causes of their rapid Disappearance; Concluding Remarks.

3d. Medical Flora of Washington and Oregon Territories. By J. G. COOPER, M. D.

All of which is respectfully submitted.

R. O. CURREY,
R. T. EVANS,
GEO. R. GRANT.

Dr. YANDELL offered the following resolution:—

Resolved, That this Association reaffirm the principles respecting the rights of constituent bodies announced in a report contained in Volume V. of its *Transactions*, in the following terms:—

"The Faculty of every Medical College shall have the privilege of sending two delegates to this Association, *provided*, that the said Faculty contain not less than six Professors, who give one course of instruction annually, of not less than six weeks, on Anatomy, Materia Medica, Theory and Practice of Medicine and of Surgery, Midwifery, and Chemistry; and also that said Faculty requires that its candidates for graduation, among other requisites, shall have attended two full courses of lectures with an interval of not less than six months between them, one of which courses must have been in their Institution."

Dr. BRECKINRIDGE in the Chair.

Dr. BUCHANAN proceeded to discuss the resolution, and at the close of his remarks, moved to lay it on the table, which was subsequently withdrawn.

Dr. BORING offered the following resolution in lieu, which he proceeded to discuss:—

Resolved, That this Association has not the power to control the subject of Medical Education.

Resolved, That the great objects of this Association are the advancement of Medical Science, and the promotion of harmony in the profession.

Resolved, That the attempt upon the part of this body to regulate Medical Education, having most signally failed in its object, and already introduced elements of discord, any further interference with this subject would not only be useless, but calculated to disturb and distract the deliberations of this Association.

Dr. CURREY offered the following resolutions in lieu of the whole:—

Whereas, The subject of Medical Education has been committed at each annual Session to Standing Committees, and various suggestions have been proposed, which the Association has adopted, and recommended to private instructors and to the Medical Colleges:

Resolved, That a committee of five be appointed by the Committee on Nominations, as a Special Committee, to be composed of members who are in no respect connected with any Medical School, to devise a *System of Medical Instruction*, to be presented for the consideration of this Association at its annual session in 1858.

Resolved, That the proposed system shall set forth a uniform basis, upon which our Medical Institutions shall be organized, as well as have reference to the best mode of securing the Preparatory Medical Instruction to the Student, and that consequently the legitimate subjects to be embraced in said system will include Primary Medical Schools—the number of Professorships in Medical Colleges, the length and number of terms during the year, the requisite qualifications for graduation, and such other subjects of a general character as to give uniformity to our Medical system, and preserve harmony and friendly intercourse in the ranks of the profession.

Resolved, That, upon the adoption of the proposed system by the Association, all Institutions which may conform to it shall be entitled to representation at the Annual Sessions of this Association, and none others.

The subject was further discussed by several members of the Association.

Dr. REESE, after some remarks, moved the indefinite postponement of the whole subject, which was lost.

Dr. ARNOLD moved the previous question, which was lost, and the discussion proceeded at considerable length, when

Dr. HOOKER moved the previous question on the resolutions of Dr. CURREY.

The reading of the various resolutions being called for, they were read to the Association.

The motion of Dr. HOOKER being in order, the previous question was called, and the resolutions of Dr. CURREY were adopted.

Dr. LINDSLEY, from the Nominating Committee, submitted the following report:—

SECRETARIES.

ROBERT C. FOSTER, *of Tennessee*, A. J. SEMMES, *of Washington City.*

TREASURER.

CASPAR WISTER, *of Philadelphia.*

For the next place of meeting, Washington City.

Standing Committees.

Committee of Publication.—FRANCIS G. SMITH, of Philadelphia, Chairman; CASPAR WISTER, of Philadelphia; R. C. FOSTER, of Nashville; A. J. SEMMES, of Washington City; SAMUEL L. HOLLINGSWORTH, of Philadelphia; SAMUEL LEWIS, of Philadelphia; H. F. ASKEW, of Delaware.

Committee on Prize Essays.—GRAFTON TYLER, of Georgetown, D. C., Chairman; J. C. HALL, of D. C.; J. F. MAY, of D. C.; THOS. MILLER, of D. C.; A. J. SEMMES, of D. C.; JOSHUA RILEY, of D. C.; W. J. C. DUHAMEL, of D. C.

Committee of Arrangements.—HARVEY LINDSLEY, Chairman, W. J. C. DUHAMEL, CORNELIUS BOYLE, P. H. COOLIDGE, G. M. DOVE, A. Y. P. GARNETT, WM. P. JOHNSTON, of D. C.

Committee on Medical Education.—G. W. NORRIS, of Philadelphia, Chairman; A. H. LUCE, of Illinois; E. R. HENDERSON, of South Carolina; G. R. GRANT, of Tennessee; T. S. POWELL, of Georgia.

Committee on Medical Literature.—A. B. PALMER, of Detroit, Chairman; A. F. ALEXANDER, of Alabama; J. M. MOSGROVE, of Ohio; P. CASSIDY, of Pennsylvania; S. POLLAK, of Missouri.

Vacancies in Committee on Medical Topography and Epidemics.—T. B. SHUFORD, to fill the vacancy caused by the death of Dr. GRAFTON, of Mississippi. C. W. PARSONS, to fill the vacancy caused by the resignation of JOSEPH MAURAN, of Rhode Island.

Special Committees.

Spontaneous Umbilical Hemorrhage of the Newly Born.—J. FOSTER JENKINS, of New York.

Influence of Marriages of Consanguinity upon Offspring.—Dr. BEMISS, of Kentucky.

Functions of Different Portions of the Cerebellum.—E. ANDREWS, of Illinois.

Causes of the Impulse of the Heart and the Agencies which Influence it in Health and Disease.—J. W. CORSON, of New York City.

Treatment of the Results of Obstructed Labor.—J. MARION SIMS, of New York.

Treatment best adapted to each variety of Cataract, with the Method of Operation, Place of Election, Time, Age, etc.—MARK STEPHENSON, of New York.

Human, Animal, and Vegetable Parasites.—JOSEPH LEIDY, of Philadelphia.

Best Substitutes for Cinchona and its Preparation in the Treatment of Intermittent Fever, etc.—B. S. WOODWARD, of Indiana.

Intimate Structure and Pathology of the Kidney.—CHARLES E. ISAACS, of New York.

Etiology and Pathology of Epidemic Cholera.—T. W. GORDON, of Ohio.

Inflammation of Cervix Uteri.—HENRY H. MILLER, of Louisville, Kentucky.

On Milk Sickness.—W. H. BYFORD, of Indiana.

Best Means of Causing an Increase in the Number of Essays.—Drs. LEIDY, WOOD, and MEIGS, of Pennsylvania.

Changes produced in Composition and Properties of Milk.—N. S. DAVIS, of Illinois.

Stomatitis Materna.—D. C. MCGUGIN, of Iowa.

On Criminal Abortion, with a view to its general suppression.—H. N. STORER, of Boston.

The Committee recommend that the committees ordered by the adoption of the resolutions accompanying Dr. A. J. SEMMES's report be filled by the several State Societies.

On motion of Dr. BRODIE, amended so as to refer the same to the officers of the several State Societies. Carried.

The Committee also recommend the amendment of the third article of the Constitution, in relation to meetings, by inserting after the words "first Tuesday in May," the words, *or the first Tuesday in*

June, and also by inserting after the words "shall be determined," the words, *with the time of meeting.*

Special Committee on the Present State of Science, as regards the Pathology and Therapeutics of the Reproductive Organs of the Female. —D. FORDYCE BARKER, of New York.

On Moral Insanity.—D. M. REESE, of New York.

On Calculi and the Diseases of the Urinary Organs, in Iowa, Minnesota, and Nebraska.—J. C. HUGHES, of Keokuk, Iowa.

On the Nature, Tendency, and General Treatment of Syphilitic Bubo. —MOSES GUNN, of Detroit, Michigan.

Organic Chemistry—its Progress and Relations to Physiology and Pathology.—Professor SAMUEL ST. JOHN, of New York.

On Medical Education.—(By Dr. CURREY'S resolution) JAMES R. WOOD, of New York; GEO. R. GRANT, of Memphis, Tennessee; JOHN WATSON, of New York; C. B. NOTTINGHAM, of Macon, Georgia; RENE LA ROCHE, of Philadelphia, Pennsylvania.

To fill a vacancy in the Committee on Medical Topography and Epidemics.—Dr. J. L. CABELL, of Charlottsville, Virginia.

Dr. MARCH moved that the Report of the Nominating Committee be taken up, and each subject to which it refers be considered separately, which motion prevailed. That portion relating to Nominations was then adopted.

The place of the next annual meeting of the Association being the next subject in order, after some discussion, on motion of Dr. MARCH, the report of the Committee was adopted.

Dr. LINDSLEY moved that, as Dr. SEMMES, one of the newly elected Secretaries, was absent, Dr. BRODIE, of Michigan, be elected Secretary *pro tem.*, which was carried.

Dr. PITCHER offered the following resolution, which was unanimously adopted:—

Resolved, That a committee of three be appointed, of which the President of the Association shall be chairman, to communicate with the Surgeon-General of the Army, the Chief of the Medical Bureau of the Navy, and the Secretary of the Treasury of the United States, with a view to secure the concurrence of these departments of the Federal Government, so that its contributions to the Medical Topography, the Vital Statistics, and the Sanitary Police of the nation may be made tributary to the labors of this Association.

The Chair appointed as such committee, Drs. Z. PITCHER, of Michigan, and R. H. COOLIDGE, of Kansas.

Dr. BOWLING, Chairman of the Committee on Prize Essays, submitted the report of said committee, as follows:—

The Committee on Prize Essays report that four essays have been received, each possessing great merit.

The Committee selected the following two essays for the two prizes, provided for at the last meeting of this Association:—

1st. One entitled "The Excito-Secretory System of Nerves. Its Relation to Physiology and Pathology," with the following motto:—

"*Observation becomes Experiment when used in severe processes of Induction*," and signed HENRY FRASER CAMPBELL, Georgia.

2d. "Experimental Researches Relative to the Nutrition, Value, and Physiological Effects of Albumen, Starch, and Gum, when singly and exclusively used as Food," with the following motto:—

"Quem sequimur? quove ire jubes? ubi ponere sedes?
Da pater augurium, atque animis illabere nostris!"

and signed WILLIAM A. HAMMOND, M. D., Assistant Surgeon, U. S. Army.

The President read an invitation to the members of the Association to visit the University of Nashville, in its Military, Literary, and Medical Departments.

The Committee on Voluntary Contributions reported in favor of the publication in the *Transactions* of the Association of the following paper: "On the Blending and Conversion of Types in Fever." By C. S. PEASE, M. D., of Wisconsin. The report was adopted.

Dr. MCMURRAY offered the following resolution, which was adopted:—

Resolved, By this Association, that the Committee of Publication be instructed to append the Code of Ethics of the American Medical Association to each volume of its present and future annual *Transactions*.

The amendments to the Constitution proposed by Dr. STOCKER, of Pa., at the last Annual Session, were taken up and laid on the table.

Dr. LINDSLEY offered the following amendment to the Constitution, which was seconded by Dr. GUNN:—

"In Art. II., omit the words 'Medical Colleges,' and also the words 'The Faculty of every regular constituted Medical College, or chartered School of Medicine, shall have the privilege of sending two delegates.'"

The amendment lies over until the next meeting of the Association, under a rule of the organization.

On motion of Dr. PALMER, the resolutions reported at the last annual meeting of the Association, by the Committees on Plans of Organization for State and County Medical Societies, were taken up and adopted.

1. *Resolved*, That the American Medical Association, appreciating the vast benefits to the advancement of medical science, to the profession, and to the interests of humanity, arising from the efficient organization of medical men, call with deep earnestness upon physicians everywhere throughout the country, to form themselves into County and State Medical Societies.

2. *Resolved*, That this Association earnestly recommend to all County Medical Societies to incorporate into their constitutions or by-laws, provisions for the election of a Board of Censors, whose duty it shall be to examine all persons who may apply for admission into the office of any member of the society as students of medicine, and also to incorporate precautions to prevent any member of such society from admitting as a student any person who shall not first receive from the Board of Censors a certificate of a good moral and intellectual character; a good English education, including a thorough knowledge of the English language, and a respectable acquaintance with its literature, and with the art of composition; a fair knowledge of the natural sciences, and at least the more elementary mathematics, including the chief elements of algebra and geometry; and, such a knowledge of the ancient languages as will enable him to read current prescriptions, and appreciate the technical language of the natural sciences and of medicine.

3. *Resolved*, That this Association also earnestly recommend to local or county societies to incorporate into their constitutions or by-laws provisions for making it the duty of each of their members to keep at least a brief record of all cases occurring in his practice depending upon endemic or general causes, and report at least annually to a committee of the society to which he belongs, the number or percentage of different diseases occurring during each month, together with the particular type of each disease, the chief modifying circumstances under which it occurred, the general plan of treatment, and the results of the cases; and also that these societies make provision for the election of such committee, whose duty it shall be to receive and collate such reports, arranging them in due form, and adding such remarks as may assist to their proper understanding, and to transmit them annually thus arranged to a committee of the State Society to which the local or County Society shall be auxiliary; and this Association further recommends that the State Societies make provisions in their constitutions or by-laws for the appointment of a committee whose duty it shall be to receive such reports from the local or County Societies to again arrange them with other reports from similar societies, placing them in a condensed or tabulated

form, and report them annually with proper remarks to a committee of this Association, to which the State Societies are recommended to become auxiliary.

4. *Resolved*, That this Association make provision for the reception of these reports from the State Societies, by a committee or committees, whose duty it shall be to arrange them in proper form, adding such illustrative remarks as may be deemed proper, and to report them to this Association, with a view of having them published with the other transactions of this body.

5. *Resolved*, That this Association recommend the adoption of its Code of Medical Ethics to all societies auxiliary to it, and that they record or publish said code with their constitution and by-laws.

6. *Resolved*, That, in the opinion of this Association, it would tend to the production of papers of great merit, and increase the interests of the meetings of local or County Societies, if those papers possessing peculiar merit were referred to the State Society as marks of honor, and to be incorporated into their proceedings, if deemed worthy.

7. *Resolved*, That, in arranging the details of the practical workings of societies, due attention should be paid to a proper division of labor, special subjects for investigation and report being referred to members who, from their mental aptitudes, their previous studies, or their peculiar opportunities or positions, are best qualified and most inclined to do them justice.

The following simple outline forms of constitutions for State and County Societies are attached, not as examples to be implicitly followed, but as affording suggestions for those engaged in forming new organizations, and, at the same time, furnishing an opportunity for presenting an illustrative detail of those features which may be considered as comparatively novel, and which have been urged as important in the report. These provisions, which are thus developed, may be ingrafted into the constitutions of societies already in existence, or enacted by them into by-laws.

PLAN OF CONSTITUTION FOR STATE SOCIETIES.

Article I.

This Society shall be called the Medical Society of the State of ——, and shall be auxiliary to the American Medical Association.

Article II.

The objects of this Society shall be the advancement of medical knowledge, the elevation of professional character, the protection of the interests of its members, the extension of the bounds of medical science, and the promotion of all matters adapted to the relief of suffering, and to improve the health and protect the lives of the community.*

* This article, and many of the other features of this plan, are taken from the constitution of the Medical Society of the State of Pennsylvania.

ARTICLE III.

Should specify who are to constitute members, the mode of their election, paying initiation fee, &c.

ARTICLE IV.

Officers shall be President, Vice-President, Secretary, and Treasurer, and a Board of Censors, &c. Mode of election.

ARTICLE V.

Duties of Officers.—President, Vice-President, Secretary, and Treasurer, as usual. Censors depending upon the laws of the State, &c.

ARTICLE VI.

Meetings.—Time of holding, &c.

ARTICLE VII.

Respecting Funds.—How raised and appropriated.

ARTICLE VIII.

The Code of Ethics shall be that of the American Medical Association.

ARTICLE IX.

County Societies may be formed auxiliary to this Society. Mode of formation. Who shall be members, &c. These things often depend upon the law of the State.

ARTICLE X.

There shall be a Standing Committee of this Society composed of such numbers and chosen in such manner as the Society may direct, whose duty it shall be to receive reports of cases of disease occurring in each county from committees where County Societies exist, as provided for by the County Societies auxiliary to this, or from individuals where County Societies do not exist, and to arrange such reports in a condensed or tabulated form, adding such general remarks as may be deemed necessary, and then transmitting them to the Committee of the American Medical Association appointed to receive them. Such reports are to be read either in full or by abstract at some meeting of this Society, by the Committee of the County Society or the individuals reporting them, or by the Committee of this Society receiving them, as the Society may direct.

ARTICLE XI.

Provisions for amendments.

PLAN OF CONSTITUTION FOR COUNTY SOCIETIES.

Article I.

This Society shall be called the ——— County Medical Society, and shall be auxiliary to the Medical Society of the State of ———.

Article II.

Should state the object of the Society.

Article III.

Members.—Of whom composed. Regular practitioners, &c. How elected.

Article IV.

It shall be regarded as the imperative duty of each member of this Society to keep a record of all cases occurring in his practice, depending upon endemic or general causes (such diseases as the different forms of fever, of inflammations, diarrhœa, cholera, tuberculosis, &c. &c.), together with the types they assume, the age, habits, and other hygienic conditions of the patient, and also the general course of treatment pursued, and the termination of the cases; and to report at least annually the absolute number of each disease, or the percentage as compared with the whole number of cases recorded, each month being reported separately, to the Committee appointed to receive such reports, as provided for in Article X. These reports are to be read at some meeting of this Society, either by the individual reporting them, or by the Committee receiving them, as the Society may direct.

It shall be considered as a dereliction of duty, punishable as the by-laws may direct, for any member of this Society to admit into his office as a student of medicine any person who shall not first present a certificate of qualifications as provided for in Article VI. of this Constitution.

Article V.

The officers of this Society shall consist of a President, Vice-President, Secretary, Treasurer, and three Censors.

Article VI.

Duties of President, Vice-President, Secretary, and Treasurer, as usual.

It shall be the duty of the Censors to examine all persons applying for admission to the offices of any members of this Society as students of medicine, and if found worthy, to give them certificates of possessing a good moral and intellectual character; a good English education, including a thorough knowledge of the English language, and a respectable acquaintance with its literature and

with the art of composition; a fair knowledge of the natural sciences, and at least the more elementary mathematics, including the chief fundamental elements of algebra and geometry, and such a knowledge of the ancient languages as will enable him to read current prescriptions and appreciate the technical language of the natural sciences and of medicine.

ARTICLE VII.

Meetings.—When held. How called, &c.

ARTICLE VIII.

Funds.—How raised and expended, &c.

ARTICLE IX.

This Society shall adopt the Code of Medical Ethics of the American Medical Association.

ARTICLE X.

There shall be a Standing Committee of this Society, of such numbers and chosen in such manner as the Society by its by-laws may direct, whose duty it shall be to receive records of cases occurring in practice from the members of the Society, as provided for in Article IV. of this Constitution, to arrange them in a condensed form, showing for each month of the year the percentage of each form of disease reported, adding accounts of the localities where they occurred, the general habits and other hygienic conditions of the people, the general meteorological characters of each month, and statements of the type or severity, or other peculiarities which each particular disease may have assumed, the general course of treatment pursued, and the general results of treatment or the termination of cases; and to transmit such accounts annually to the Committee for receiving them of the State Society to which this Society is auxiliary.

ARTICLE XI.

Provisions for altering or amending this Constitution.

A. B. PALMER, *Chairman.*
N. B. IVES.

The following resolutions were offered and adopted:—

By Dr. PITCHER—

Resolved, That the members of this Association, as recipients of the cordial, generous, and elegant hospitalities extended to them by the profession and the citizens of Nashville, in placing on record an expression of thanks for the social amenities they have enjoyed during its tenth annual session, wish also to leave behind them the

assurance, that the recollection of their short sojourn in Tennessee will be cherished as dearly as the remembrance of the far-off sound of water by the exhausted and wayworn traveller.

By Dr. MEANS—

Resolved, That the earnest thanks of this body be presented to the authorities of the State and City, who have tendered this magnificent State Capitol for their sittings during the present session.

By Dr. CURREY—

Resolved, That the thanks of this Association be tendered to the Reporters of the City Press, for the accuracy and promptness with which they have reported the proceedings of the Association, and to the Publishers, for the liberal supply of their morning papers during the Sessions of the Association.

By Dr. WISTER—

Resolved, That the thanks of this meeting be presented to Dr. WM. BRODIE, for the efficiency with which he has discharged his duties as Secretary.

By Dr. BYFORD—

Resolved, That the State and County Societies throughout the Union be requested to recommend their members to purchase the *Transactions* of the American Medical Association, and that their officers act as agents for the same.

On motion of Dr. GUNN, of Michigan, the Association recognized the presentation of a pamphlet by HENRY FRASER CAMPBELL, M. D., claiming "Priority in the Discovery and Naming of the Excito-Secretory System of Nerves."

On motion of Dr. BYFORD, the Association then adjourned *sine die*.

R. C. FOSTER,
A. J. SEMMES, } *Secretaries.*

REPORT

OF

THE COMMITTEE OF PUBLICATION

AND OF

THE TREASURER.

REPORT OF THE COMMITTEE OF PUBLICATION.

THE Committee of Publication respectfully report:—

That as soon after the adjournment of the Association, at Detroit, as was practicable, volume ix. of the *Transactions* was put to press, and copies were distributed in the first week of November of last year. The size of the edition was one thousand.

The aggregate expense of printing, paper, illustration, and binding, was eighteen hundred and forty-six dollars and eighty-seven cents ($1,846 87).

The distribution of the volume was, as in previous instances, effected by express, and where a number was required at any one point, they were sent in large packages, and the services of a resident member of the Association was solicited to superintend their delivery. In some instances, copies were sent by mail, the recipients bearing the expense of postage.

The Committee would respectfully urge upon the Association the necessity of keeping down the size of future volumes, as any increase would preclude the possibility of delivery through the post-office, and distant members thus lose the opportunity of receiving the *Transactions*. The present volume is of the utmost limit receivable by the post-office department.

The following gentlemen have rendered essential service to the Association in procuring subscribers to volume ix.: Dr. ALDEN MARCH, Albany, N. Y.; MED. SOCIETY OF THE STATE OF DELAWARE; Dr. C. GOODBRAKE, of Ill.; Dr. J. M. BORLAND, of Boston, Mass.; Dr. E. L. BEADLE, of N. Y.; Dr. C. HOOKER, of New Haven, Conn.; Dr. F. E. B. HINTZEY, of Balt., Md.: Drs. PALMER and MILLER, of Chicago, Ill.; and Dr. WM. BRODIE, of Detroit, Mich.

The following gentlemen have kindly aided in distributing the

volume: Drs. H. W. DESAUSSURE, of Charleston, S. C.; J. L. ATLEE, of Lancaster, Pa.; J. B. LINDSLEY, of Nashville, Tenn.; and J. B. CLENDENNIN, of Cincinnati, Ohio.

To all of these, the Committee desire to express their grateful acknowledgments.

They also desire again to call the attention of the Association to the resolution adopted at the last and previous meeting, requiring all papers intended for publication in the volume for the year in which they are presented, to be in the hands of the Committee of Publication, on or before the 1st of June. Much delay is experienced by non-compliance with this resolution, and when this is coupled with that caused by the transmission of proofs to every part of the Country, it will explain the tardiness in issuing the *Transactions*, which, under other circumstances, might be in the hands of the members at a much earlier date than heretofore.

The following schedule exhibits the number of volumes of the *Transactions* on hand at the close of the last session, those disposed of during the past year, and those now in possession of the Association. It will be seen that the Association now owns but five complete sets of the *Transactions*, which, by a resolution offered at the last meeting, they were directed to retain.

Vol. I. On hand at date of last report . .	41 copies.
Disposed of during past year . . .	9
Remaining	32
Vol. II. On hand at date of last report . .	9
Disposed of during past year . . .	4
Remaining (property of the Association) .	5
Vol. III. On hand at date of last report . .	27
Disposed of during past year . . .	12
Remaining	15
Vol. IV. On hand at date of last report . .	7
Disposed of during past year . . .	2
Remaining and purchased	6
Vol. V. On hand at date of last report . .	316
Disposed of during past year . . .	14
Remaining	302

Vol. VI. On hand at date of last report . .	66
Disposed of during past year . . .	9
Remaining and purchased	68
Vol. VII. On hand at date of last report . .	120
Disposed of during past year . . .	8
Remaining	112
Vol. VIII. On hand at date of last report .	351
Disposed of during past year . . .	73
Remaining	278
Vol. IX. Whole number published . . .	1000
Disposed of to Members, and Med. Journals at home and abroad, and sold . . .	625
Remaining at date of Report . . .	375

All of which is respectfully submitted.

FRANCIS G. SMITH, JR., *Ch'n.*
H. F. ASKEW,
SAML. LEWIS,
S. L. HOLLINGSWORTH,
CASPAR WISTER,
WM. BRODIE,
Committee of Publication.

REPORT OF THE TREASURER.

THE Treasurer respectfully reports:—

That, in compliance with a resolution passed at Detroit, a circular has been sent to the address of each permanent member of this Association, announcing the repeal of all pre-existing laws, by the operation of which membership with this Association had been rendered conditional upon an annual subscription to the *Transactions*. The wisdom of the Association in retiring from all attempt at coercion, is visible in an increased demand for the *Transactions*. The subscription for the previous year has been exceeded to the amount of nearly one-fourth since it has been announced to permanent members that the privilege of subscribing to the volume might be exercised or declined at pleasure.

Very general subscription to the *Transactions*, on the part of permanent members, is necessary for the treasury, for there has not been at any meeting of the Association a sufficient number of delegates present to pay for the printing of the *Transactions*, and in the event of two small meetings of the Association in succession, the balance in the treasury would be expended, and every exertion to dispose of the *Transactions* among the permanent members be required to procure means for the Committee of Publication.

In view of these facts, it is of the utmost importance that the funds of the Association should not be diverted, under any pretext, from their accustomed channels, these being supplied mainly through the personal exertions of a limited number of active members.

CASPAR WISTER,
Treasurer.

Caspar Wister in account with

DR.

April 15, 1857.

To cash received from Dr. Caspar Wister, Treasurer, being the balance in the treasury, April 15, 1856 .	$950 52
To cash received from delegates, and from sale of *Transactions*	1,662 51
To cash received from Dr. Alden March, for *Transactions* sold, Albany, N. Y.	24 00
To cash received from Dr. E. D. Daily, for *Transactions* sold, Smyrna, Del.	45 00
To cash received from Dr. C. Goodbrake, for *Transactions* sold, Clinton, Ill.	12 00
To cash received from Dr. J. B. Borland, for *Transactions* sold, Boston, Mass.	126 00
To cash received from Dr. E. L. Beadle, for *Transactions* sold, New York, N. Y.	63 00
To cash received from Blanchard & Lea, for *Transactions* sold	57 75
To cash received from Dr. Chas. Hooker, for *Transactions* sold, New Haven, Conn.	131 50
	$3,072 28

	$3,072 28
By balance in hand	819 01

the American Medical Association.

Cr.

April 15, 1857.			
By cash paid T. K. & P. G. Collins, for paper and printing of *Transactions*, vol. ix. . .	$1,473 77		
for extra copies of Dr. Wood's Address .	14 05		
" " " Dr. Blatchford's Report	16 00		
" " " Dr. Fenner's Report .	17 55		
" " " Dr. Cain's Report .	7 90		
" " " Dr. Barton's Report .	7 70		
" " " List of Perm't Members	20 70		
for binding 1,000 copies	230 00		
for printing 1,500 circulars . . .	7 50		
for postage paid on Reports of Committees	17 85		
	1,813 02		
Less 5 per cent. . .	90 65	$1,722	37
By cash paid D. C. Baxter, for engravings on wood		16	00
By cash paid Thomas Sinclair & Co., for lithographic drawings and printing . . .	184 07		
Less 5 per cent. . .	9 20	174	87
By cash paid Messrs. Blanchard & Lea, for freight, packing boxes, and other expenses of delivery		59	91
By cash paid Dr. Henry Hartshorne, as per award of Committee on Prize Essay . .		100	00
By cash paid Jno. A. Kerr, Detroit, for engraving and printing certificate of membership, as per order of Dr. Z. Pitcher		45	00
By cash paid H. M. Barnes, for services as clerk		50	00
By cash paid for exchange at Detroit . .	7 50		
and loss on uncurrent money . . .	11 87	19	37
By cash paid Dr. Wm. Brodie, Secretary, for express charges, stationery, and postage .		16	00
By cash paid Dr. Caspar Wister, Treasurer, for postage and stationery		9	45
By cash paid Dr. Frank H. Hamilton, for lithographic stone for his Report . . .		37	50
By cash paid Dr. F. G. Smith, Chairman of Com. of Publication, for postage and forwarding .		2	80
April 15. To balance on hand		819	01
		$3,072	28

We have examined the accounts of the Treasurer, and compared them with his vouchers, finding all correct, leaving a balance of $819 01, due the Association, at the close of the fiscal year, April 15, 1857.

H. F. ASKEW,
FRANCIS G. SMITH, JR.,
SAML. LEWIS.

ADDRESS

OF

ZINA PITCHER,

PRESIDENT OF THE ASSOCIATION.

ADDRESS OF ZINA PITCHER,

PRESIDENT OF THE ASSOCIATION.

ASSEMBLED as we are here, under the auspices of the medical profession in Tennessee; meeting in presence of the citizens of this beautiful city, honored by representatives from that better part of our creation, who, like the Amarant of Milton, throw their shadows and shed their fragrance o'er the waters of the fount of life; coming as we have in considerable numbers from distant portions of the United States, abandoning for the time being our private engagements, and encountering on our way hither the hazards incident to velocity in locomotion, as if only to enjoy the social amenities and the pleasures of professional reunion, these two questions naturally arise in the minds of those who are merely witnesses of the spectacle presented by our assemblage: "For what purpose is this convocation of physicians? What is there in the nature of their particular pursuit which prompts them thus to relinquish its rewards, to forego the endearments of home, when there is no visible manifestation on their part of a design to promote those objects which centre in self-interest, to advance the purposes of sectarian ambition or political partisanship?"

In the fulfilment of a duty incident to the position which I have had the honor to hold for the past year, a year full of pleasant recollections to myself, I shall, whilst designing in brevity to follow the example of my honored predecessors, attempt an explanation of the phenomenon we may be supposed to present to the mind of an intelligent, but uninitiated observer.

Before entering upon the task I have assigned to myself, I beg you to indulge me one moment, in repeating to the Association my assurances of gratitude for the distinction I have received at its hands, and for the personal manifestations of confidence and the

acts of courtesy I have received from many of the individual members, the recollections of which will linger in my memory, and lessen the consciousness of my weight of years, on the remainder of my journey down the declivity of life.

The objects for which the Association was formed will ever enlist my warmest sympathies and command my active co-operation. I congratulate you on the happy circumstances by which this anniversary meeting is attended, on the evidences of vigor and the promises of longevity which this Association derives from its annual migrations. God grant that its existence may be prolonged by these annual renewals of its vitality, so long as there are evils for it to reform or works of beneficence for it to accomplish.

To do what I have proposed satisfactorily to myself, would involve the necessity of showing the relation which medicine has held to the civil authority, to the ecclesiastical power, and to the social condition of the people for all time antecedent to the date of this organization. This review would also lead us to consider the relation which free governments bear to letters, to science and the arts; a field too large for us to occupy on the present occasion. We shall endeavor, without attempting all this, to present to your view the condition of the profession at the time this organization sprang out of the antecedent chaos, the cause or causes of that condition; whether inherent and incurable, or whether arising from intrinsic circumstances which may be remedied, and whether this remedy is to be found in public authority, or sought for in associated professional influence.

We remark first that a great and immutable law marks and governs all the works of creation. It is typified in the individual mind—in our corporeal functions—in the movements of the race—and in the revolutions of the heavenly hosts—all are subject to this law of periodicity, and this alteration of condition manifests itself even in the domain of disease. We have seasons of activity and repose in the natural as in the moral world; periods of illumination and obscurity, of activity and of rest: in the one case, producing day and night, winter and summer; and in the other, those alternations of social condition which have been spoken of as the Athenian age, the age of darkness, literally a long and profound intellectual eclipse, to which has succeeded the active era of mental excitement and of material progress in which we live, by which we are moved, the sun of which appears not yet to have reached its point of culmination.

In all the struggles which have marked the conflict between truth and error, ignorance and knowledge, medicine has always taken a conspicuous part, having ever been a faithful auxiliary, when not a leading element, in every effort made to elevate and improve the condition of mankind, at one time allied to sacerdotal authority, as an indweller of the temples, and at another incorporated into the body politic, or rather ingrafted upon the tree of State.

In the earlier stages of civil advancement, in all those territories once composing the eastern and western empires, as is the case now in Europe, where certain forms of government exist, the sovereign authority prescribed the modes of worship, the forms of law, and the requirements of medical practitioners. Unless the rigorous conservatism of these existing European governments is relaxed by the caprice of vain and foolish princes, at the suggestion of wicked men or misguided women, the right to exercise the functions of the physician is only conferred on the most satisfactory proof of indefatigable culture. And in the earlier pages of our own national history, we find the foot-prints of our European ancestors in the records of those salutary laws made for similar purposes, and transmitted to us by our political progenitors.

But in the process of time, when our form of government was changed, when the repository of sovereignty became inverted, when the power of the State passed from the few to the many, when the State became nothing and the citizen all in all, when this segregation of the sovereign power was rendered complete by the absolute freedom of the elective franchise in many of the States, then our art ceased to have a party in the commonwealth, as the law which became the exponent of this new opinion, the expression of the popular intelligence, effaced from the public record all legal traces of distinction between the physician and the hypocritical pretender.

When these ancient legal incentives to study were withdrawn, a new class of men, unprepared by mental discipline, rushed into the professional arena, bearing down by their numerical force the few remaining barriers which society was disposed to defend, notwithstanding the abrogation of law.

The political revolution which separated the American colonies from the British crown, by loosening the connection between the Church and the State, insensibly led the way to the more complete separation of medicine from governmental control and political dependence. These manifestations of popular absolutism, which swept away the prerogatives of the clerical and medical professions,

threatening to involve the law in the same unchartered equality, were the remote causes of the professional abasement we had then reached, a humiliating consciousness of which aroused its members, who, in the hope of reinstating its departed dignity, formed this Association.

Whatever effect this unrestricted distribution of political power through all ranks of society may have had upon the social body, it is not our business to inquire, as ours is not a political institution, but of its immediate influence in reducing medicine to a state of degradation, there is no reason for doubting the fact nor the propriety of this exposition; for, with physicians, etiology is often a key to diagnosis, and without a true pathology there is neither safety nor certainty in the therapeutics.

In treating of medicine in its social and political relations, it is not my design, as I have no wish, even if the power were inherent, to change our organization, or to advise an essential departure from our plans of operation. I have presented the subject in this light more for the purpose of reviving the courage of members who may have begun to despair of success, because the objects we set out to accomplish have not been at once achieved.

Time must be given for results to mature, as all social institutions are of slow growth. Those who clothe and feed the members of them, must become imbued with a sense of their importance and necessity for their advancement, as a means of promoting the public good, else their coöperation cannot be secured. Hence our duty of endeavoring to move the social body and all its dependencies, like the horses of a Grecian chariot all abreast, striving at the same time to shield ourselves against the propensity inseparable from the absolutism of a pure democracy, to hedge down every object that raises its head above the surrounding social level.

We have stated with general accuracy, but perhaps not with strict regard to literal historic truth, that this Association was formed to repair the evils resulting from the dissevered relation of medicine to the State authority. Whatever formula we use in expressing the idea, or by whatever rationale we explain our conception of the evils said to exist, for which it was designed to furnish the remedy, the records show that its mission was to reform the medical schools of the United States, and to improve the preparatory education of students of medicine.

The development of organic bodies depends upon the absorption and assimilation of extraneous materials. If the same law regulates

the growth of institutions, it becomes a matter of some interest to inquire whether the schools are an outgrowth of the profession, or whether the profession is the product of the schools, for in either case, there is a labor for us to perform, and the answer to this question determines the place of beginning.

Lest a doubt might arise as to the correctness of the opinion we wish to impress upon the professional mind, that society itself, and not we alone, are amenable to censure for the abasement to which the profession of medicine had descended at the date of our associated existence, let us for a moment look into the records of the past, to see whether we cannot find an antecedent era, in which the world has been subjected to similar moral cataclysms, by which ancient institutions were broken up, their materials converted into drift, to lay the foundations of newer and more horizontal strata, from which we may draw lessons of wisdom applicable to our own time and our own condition.

We believe that there is no period of ancient history into which that of our art is intimately interwoven, presenting more analogies to our own, and, at the same time, so distinctly marked by strong antitheses, as that which intervened between the death of the Saviour and the birth of Mohammed, when, for more than five hundred years, a mighty struggle was going on between that Divine Word, "who lighteth every man which cometh into the world," the spirit of the Judean religion and the majesty of the Roman Empire, the latter aided by a fascinating philosophy, made beautiful by the æsthetics of Longinus, each striving for the possession of the human race.

Whilst the empire thus labored to throw its Upas shadow over the infant church, a social disintegration of castes, owing to these struggles and the irruption of barbarian hosts from the north, took place, and a consequent universal fusion of the races, languages and customs, producing an excitation of thought, and a blending of people analogous to the social fusion and the blending of types of disease, which we see daily taking place in our own time and in our country. The minds of men thus cut loose from their ancient fastenings, sought new affinities, arranged themselves in accordance with those affinities into new forms, many of whom wandered into unexplored paths, hoping without the aid of a Divine guide to ascertain their relation to the unseen.

Thus also did the members of our own profession wander into untried and forbidden paths, in pursuit of the ideal, up to the time

this Association was formed. A faithful picture of the last century of this historic period, presents the deepest contrasts of light and shadow that can be portrayed in a single work of art. The darkest hue of vice being drawn in the same pannel with the purest tints of virtue. The church, young and vigorous, being soiled by its contact with a paganism inexpressibly wicked, against which it waged a war, unmitigated by acts of mercy.

The outbreaks of emancipated human thought at each of these epochs have had their use: have produced their fruits—late in arriving at maturity it is true—and especially so will it be with the germs that are scattered in the midst of the confusion of our own times. An abiding faith, that good seed, in spite of the tares that may choke it, or the birds that may devour it by the wayside, will spring up and produce fruit in good season, has led me into this historical retrospect.

During the period to which we have alluded just sufficiently to show what forces disturbed and broke up the ancient civilization, we find on closer examination, that the laws of the empire relating to medicine, though unrepealed, were not enforced.

These laws made it the duty of the provincial governors to send the youth, subject to their jurisdiction, up to the city magistrates, where they were required to submit to the most rigid system of surveillance by the municipal authorities, their conduct as students, their deportment as citizens, being subjects of official scrutiny. The medical pupils under the training of the Archiatres, or State physicians, were fitted for the performance of their duties in either the wards of the cities or in towns or villages, whither they were sent by imperial authority, on the requisition of the inhabitants, who paid for their services a stipulated price.

Notwithstanding these requirements of law were left unrepealed, the new opinions which had got possession of the popular mind, being more powerful than statutes, when enforced by the Perabolani, a body of religious medical enthusiasts, and various other pretenders, who, impelled by the spirit which animates a people having just been taught to exercise the privilege of judging in matters of faith, became presumptuous in matters of science, and by applying this newly acquired right of action to medicine, having numerical strength, they over-rode the prerogatives of caste, and trampled under foot the wisdom of all preceding ages.

Whilst these conflicts of opinion were being carried on in an age that produced an Athanasius, a Jerome, a Chrysostom, and an Au-

gustine, and a system of Christian ethics which absorbed into itself all that was valuable in the philosophies of Greece and Egypt, medicine acquired celebrity from such names as Cæsarius, who became an Archiater palatinus, Oribasius, whose works remain as monuments of his genius and proofs of his culture; Ætius, Alexander of Tralles, and Paulus Ægineta, scarcely inferior in reputation to the father of medicine himself. The lustre of these names seems but the more expressively to mark the twilight of that night destined thence to brood over Europe, whilst the materials of the ancient civilization, broken into fragments by a rude and vigorous barbarism, were slowly wearing away the characteristics of the conquering hordes, and preparing the way for its reappearance, in new forms, through the instrumentality of the free cities and the feudal institutions of Europe.

During this general eclipse of letters, its occultation continuing till the art of printing was invented, we have had furnished to us an opportunity of seeing how inadequate statutes alone are to the development of institutions, and how impotent they are, even when aided by professional coöperation, to resist the obstacles interposed by an adverse public opinion.

If our design has been accomplished, we have shown that the work of medical regeneration is to be commenced by the profession, whose success is made dependent upon an intelligent concurrence of the popular judgment. But it must be remembered, that in attempting to bring about essential changes in social life, in public policy, or in the constitutional relations of the different States, by whose happy form of union we are permitted to meet here to-day as fellow-citizens of a common country, we must keep in mind this fact, that all organic nature is developed from embryonic existences—that all great changes in opinion have had their origin in germs, planted long antecedent to the production of fruit, and that advances in science and improvements in the method of its application to art, have also had their seed time, their period of growth, and must ever have their day of fruition.

History is filled with exemplifications of the truth of this remark, and of evidences of the perpetuity of this law. The first step on the road to the trans-Atlantic Telegraph was taken by Volta, when he constructed the Voltaic pile—the next was the formation of the Galvanic Battery. These inventions were followed by the discovery that soft iron becomes a magnet when subjected to the action of an electrical current and resumes its normal condition as soon as the

current is withdrawn. Then it was proved that the magnetic action of a current of electricity is not lessened in intensity by passing through a long wire. Out of these antecedents, by the help of Grove's permanent battery, the Magnetic Telegraph was developed and the art of magnetic printing evolved.

But for the researches of Vesalius, who had traced out the course of the lacteals, the splendid discovery of Harvey of the circulation of the blood might have been a long time postponed.

Notwithstanding the perennial influence of those causes to which we have ascribed the tendency to professional abasement, we have met here to arrest and to counteract, there is, in the condition of things by which we are surrounded, much to inspire us with confidence and to stimulate us to exertion.

We have not now, as did those who lived in the time of our historic analogue, to resist the pressure caused by the debris of an effete culture.

We have not to contend against the influence of those monstrous forms of superstition which grew out of the conjunction of Christianity, when defiled by a co-partnership with the civil power, and the decaying institutions of its pagan predecessor, when a phase of credulity was developed which would prescribe the contents of a mummy case, in preference to the creasote involved in the process of the manufacture of mummy, once an article of Egyptian commerce.

Those political causes to which we have alluded as tending to diminish the distance between our pre-existing social extremes, whereby the medical profession lost its claim to legislative protection, have already produced the signs of a growing national homogeneity, by fusing and re-casting into an American mould the various elements of which the nation is composed.

Among these materials, so readily amalgamated, which by their youth, energy, and plasticity, give us our national character and national manners, there are some which need to be brought under the hammer of the forge, as well as the heat of the furnace, before they can be welded into the social mass. I allude to a class of men, wearing ecclesiastical habiliments, not wise enough to comprehend that the professions are the growths of civilization, developed by the wants and necessities of society, each one having its part to act in the drama of life, nor possessing that degree of self-respect, which would prompt a man, not even claiming to be divinely called, to avoid the contact of things proclaimed to be unclean.

When I speak of this class I do not mean the great body of American clergy—men who, instead of practising a heterodox medicine, both practise and preach the precepts of their Divine Master as things which appertain to man's social and everlasting peace. But I mean a class, who, as if bitten by some moral scorpion, become blinded by a phrenitic distemper, and like the great adversary of the Philistines, are ready to pull down the pillars of the temple, regardless of the ruin impending, whether that ruin involve a simple social element or the integrity of the national fabric.

Having, then, in our favor the vigor and impressibility of a new people, the resources of a new and rapidly developed country, the intelligence of a self-governing population, the augmentations of that intelligence by the unrestricted importations of learned works and the immigration of cultivated strangers, and the propulsion derived from a free and active press, we have a right to expect success. With such auxiliaries, by a persistent assiduity on our part, we shall at some future day enjoy the happiness of seeing our labors crowned with the pageant of a brilliant triumph.

The one thing already achieved, in the adoption and enforcement of the code of medical ethics, is worthy of commemoration by the observance of an annual holiday. Till then we had suffered more from quackery within the profession than from irregularities without. Now that order of things is reversed.

From a survey, even of the surface of society, we learn how soon the knowledge derived from medical sources strikes its roots into the popular soil. Take as example the subject of organic chemistry, and we shall see how rapidly its principles are passing into the stock of general intelligence. The numbers are daily on the increase in every community, of those persons who know the necessity of nitrogenous articles of diet when repairs are to be made in the fibrous and areolar tissue, and how important an agency the carbo-hydrogens are supposed to exert, by increasing combustion in the removal of certain morbid conditions of the lungs. In this way, the mutual relations of the profession to the people are made apparent. The instruction communicated by the scientific physician is refunded to him in the increased capacity of the people to appreciate his worth.

We have spoken of the professions as the products of a general culture, to which, in our country, they must of necessity bear a fixed and definite relation, and of the reciprocal influences they

and the society out of which they spring, exert upon each other. We have shown in a single example by what apparently simple gradations in scientific discovery, men are led to great practical results. As an incentive to industry, and as a reason for confidence in slow but certain success, we will detain you one moment longer, in a hasty sketch of the materials for thought that arise out of the contemplation of the field of nature, such a scene being as suggestive of thought, and as full of instruction, as the examples furnished by the achievements of art.

In adjusting our telescope, to study the features of some snow-clad mountain, the organ of vision perhaps takes in the form of an enterprising explorer, whose feet still sparkling with ice as he descends from its summit, will crush out the fragrance of the plants which spring up to greet him as he walks downwards into the valley of flowers. From the eminence attained by his enterprise, he could trace the course, and measure the elevation of the mountain chains, which give origin and direction to the rivers, affect the commerce, the languages and migrations of men, fix the character of the vegetation, the abode of its mammalia, and the habits of its population.

Subsidiary to the interest excited by this scene as a landscape, but not subordinate in importance, lies the geographical formation of the ranges which contain their mineral productions, give character to their fountains and increase to the variety and beauty of the vegetation, both on the slope of the mountains and in the valleys below.

Although a scene like this may excite emotion in the bosom of a savage, and awaken a sentiment of adoration for the majesty and power which can give such grandeur to nature, and even pass from the mind of an ordinary observer without any other expenditure of thought, yet to master it as a subject of scientific study would require a preparatory knowledge of what is contained in the writings of Werner and Hutton, and Miller on Geology, of Cuvier and Buckland on Paleontology, of Geoffrey St. Hilaire, and Agassiz on the races of men and the migration of Animals, of M. Balbi on Ethnography, and of Linnæus and De Candolle and Torrey and Gray on Botany. And to condense the whole into the compass of the "Cosmos," would require the genius and longevity of a Humboldt.

What is there, then, gentlemen, left for us to do but to declare

the perpetuity of this Association, and renew our vows of fidelity to the requirements of its constitution?

In this proclamation and in these vows are involved the pledges, that in our professional acts we will honor the principles of moral law, which lie at the foundation of our Code of Medical Ethics. That we will use our individual influence, and so try to direct the power of this Association, as to secure a higher mental culture to medical students and candidates for medical honors. When this is accomplished, the medical schools will rise in character as a correlative effect, and the profession establish for itself a legitimate claim to public confidence and popular esteem. Our custom of meeting in each successive year, in a different State of the Union, prevents the decay of the body by the introduction of new material; and we illustrate in this way the doctrine of Zymosis, by the rapid assimilation of these new elements into the common mass. Another custom of the Association has done much to bind it to the individual States, that of shedding its honors upon the profession of the State in which the meetings are held, through which we hope to secure the sympathies of the people, and enlist them as allies in the warfare we are engaged in against the hosts of ignorance.

A departure from the established usage of the Association, in either of these particulars, would mark the date of its decline both in vital force and mental vigor. Any restriction put upon its freedom of motion, or attempt made to centralize its influence, would enstamp it with the seal of decay.

But if the avenues to material success are so direct and brilliant that the talent of the country is tempted to take the shorter road to wealth, whereby we fail in our attempt to lay the foundation of a national medical literature, in holding up a high exemplar to the medical student, by teaching him the necessity of a thorough preparatory discipline before commencing professional studies, and urging him by the force of opinion to master the elements of his profession before assuming the responsibilities which attach to the discharge of its duties, we may yet in one way leave our traces upon the national character and our foot-prints on the national history, in the hallowing of one day in our annual calendar, on the recurrence of which we may have, by the example of our patriotism, the stamp of nationality, in bringing to our shrine no sectional passions, and so conducting our proceedings that brilliant memories shall adorn our annals, the names of our celebrities be embalmed as national benefactors, and the anniversaries of this Association, in

honor of their services, shall form by popular consent one of the holidays of this glorious republic.

"Often in the crises of sectional commotion the moral necessity of a common shrine, a national feast, a place, a time, or a memory sacred to fraternal sympathies and general observance, appals the patriotic heart with regret, or warms it with desire! Were such a nucleus for popular enthusiasm, such a goal for a nation's pilgrimage, such a day for reciprocal gratulation our own—a time when the oath of fealty could be renewed at the same altar, the voice of encouragement be echoed from every section of the confederacy, the memory of what has been, the appreciation of what is, and the hope of what may be, simultaneously felt, what a bond of union, a motive of forbearance, and pledge of nationality would be secured!"

By the blessing of the Divine Founder of our holy religion, who, nineteen hundred years ago, went up to Jerusalem with his disciples to celebrate a national feast, may the proceedings of this body be so overruled that the recollections of this meeting at Nashville to day, when softened by the "moonlight of memory," may become a hallowed event in the annals of our yearly migration.

REPORT

ON THE

MEDICAL TOPOGRAPHY AND EPIDEMICS

OF

MARYLAND.

MEDICAL TOPOGRAPHY AND EPIDEMICS OF MARYLAND.

THE undersigned, appointed by the American Medical Association, at the session held in Philadelphia in the year 1855, to report on the Medical Topography and Epidemics of Maryland, and having associated with himself C. C. Cox, M.D., of Easton, and A. M. White, M. D., and Edmund G. Waters, M. D., of Baltimore, respectfully offers the following:—

In the section of Maryland lying on the east of the Chesapeake Bay, and in those parts of the western portion remote from the large cities, we are seldom visited by epidemics. With the exception, probably, of influenza, which pervades whole continents, other epidemics—as scarlatina, variola, rubeola, pertussis—are often limited to narrow bounds. From dysentery we receive *sporadic* visits every year, but many years sometimes pass before it appears as an epidemic. In this report I shall confine myself to brief notices of the most important.

TYPHOID FEVER.—Many pages have been written for the purpose of settling the question as to the name which would most clearly designate the disease known as typhoid fever. It has been called nervous fever, typhus mitior, dothinenteritis, gastro-enteritis, continued fever, enteritis, &c. &c. To all of these some objections might be urged, but it is not my design to enter into the discussion. The term typhoid fever, not less objectionable than others, is that by which the disease is most generally known; and though I have seen it run its whole course without evident enteritis, rose spots on the abdomen or elsewhere, diarrhœa, or tympanitis, I retain the name for the peculiar affection which in many instances exhibits all these signs.

This form of fever is said to prevail only in regions exempt from

malarious influence. This is not always true; but it *is* true that in those parts of Maryland where the endemic bilious fever is known, typhoid fever is seldom seen in autumn. For some years past—1854, 1855, and 1856—our bilious endemic has been of rare occurrence in Kent and the neighboring counties, and in these years typhoid fever has prevailed to an unusual extent, even in the autumnal season. Many more cases, however, occur in winter and spring; and the pneumonia and erysipelas of those seasons are accompanied by a *typhous* grade of fever.

To what influence our comparative exemption from the annual visits of bilious fever and its sequelæ is to be attributed, is a question which has not been satisfactorily answered. The average temperature of the summer and autumn of the years 1854, 1855, and 1856, has been about the same as in preceding years when the disease in question prevailed extensively; and the annual decomposition of vegetable growths has, in fact, been greater, in consequence of the great increase in the productiveness of the land. We must look, then, to some other source for the remote cause of bilious fever.

The diagnosis of typhoid fever is not clearly marked in the first stage. The symptoms are almost identical, excepting in the graver cases, with those of the ordinary endemic remittent which prevails throughout the eastern portion of Maryland, and in the vicinity of the watercourses which empty into the Chesapeake on its western side. In a treatise on a disease so well known, and on which so many volumes have been written, it is deemed unnecessary to enumerate the symptoms. A few days will remove all doubt with regard to diagnosis. From the commencement, the physician will proceed cautiously in using his remedial agents. A mild cathartic, of which some preparation of mercury should constitute a part, should be administered; and if this should not remove or decidedly mitigate the usually attending cerebral distress, a few leeches may be applied to the temples, or cups to the back of the neck, near the base of the cranium, with much benefit. If pulmonary symptoms present themselves, cups to the thorax, or near the spine, as close to the part affected as possible, together with the ordinary mercurio-antimonial treatment, will be found not only useful, but indispensable. If there be much tenderness over the iliac region, indicating enteritis, leeches, associated with mild saline aperients, should be applied. Warm poultices over the abdomen, and mucilaginous drinks, are beneficial. If the tongue be red and dry, and especially if coexisting

with tympanitis, much relief may be confidently expected from the use of the oil of turpentine in the form of emulsion, in doses of ten to twenty drops every two or three hours. It may be well here to remark that, though diarrhœa be absent, the stomach and bowels are unusually sensitive to the operation of cathartics, and, of course, much more readily acted upon than in other fevers. The mildest aperients, therefore, should be administered when required; and for this purpose a Seidlitz powder, emulsion of oleum ricini, or Rochelle salt, will be found sufficient.

The existence of those morbid changes in the intestines, and especially in Peyer's patches and Brunner's glands, so much insisted on by authors, I have not been able to verify by *post-mortem* examinations. In country practice, death from this fever is rare, and permission to examine bodies after death is almost always refused. The existence of such changes is not disputed, and that in consequence of them there is danger to be apprehended from perforation of the intestine. This consequence, if not prevented by previous treatment, is, in a great majority of cases, surely fatal. Generally, there is more danger to be apprehended from pulmonic complication, especially when occurring in the second or third week. In the first week, such local complication is no more dangerous than in ordinary bronchitis or pneumonia unmixed with typhoid fever, but generally gives way to local bleedings by cups or leeches, the mercurio-antimonial treatment, and blistering.

Uncomplicated by local derangements, typhoid fever, as seen in country practice, generally runs its course free from danger, if treated with due caution, without too much professional interference. A "masterly inactivity" is the better policy in such cases, but there must be an unceasing watch kept up for occasional complications.

The medical attendant will always find more or less disturbance from defective or vitiated secretions. To correct these, small doses of calomel or of the blue pill, associated with bicarbonate of soda, chlorate or tartrate of potash, with gum-Arabic, will generally succeed. Blistering the extremities, so much practised many years ago in fevers of low grade, seldom does good, but, on the contrary, much mischief, by producing extensive sloughing.

Quinine, now much employed by practitioners in large cities, in the vain effort to cut short the fever, has proved in my hands utterly useless during the first and second weeks of typhoid fever. In the last stage, when the disease in malarious districts sometimes takes on a remittent character, and may be supposed to partake somewhat

of malarious influence, this medicine has in a few cases seemed to suspend or prevent the exacerbation, and thus has prepared the way for a safe convalescence. In the narrow lanes and alleys of crowded cities, where the stagnant atmosphere is loaded with morbiferous exhalations—where the inhabitants are insufficiently clothed and fed—localities which typhoid fever claims as its own proper empire—the sulphate of quinine, in combination with camphor, serpentaria, &c., and a generous and nutritious diet, may be found useful; but in the open and pure air of the country I have given it a fair trial, and, though but little or no mischief could be detected from its use, I have never, as before remarked, been able to discover any benefit from it. It seldom acts on the skin, and never shows its specific effect on the cerebral nerves.

DYSENTERY.—In the year 1851, diarrhœa appeared late in May, and prevailed extensively until July, when dysentery took its place. Early in May a rainy spring terminated, and we had, almost literally, no rain until November. The Summer was excessively hot; the thermometer ranged from 75° to 94° Fah. from June to the middle of September, for a few days only falling as low as 75°.

This epidemic was attended by its usual symptoms: frequent mucoid stools, generally, not always bloody; severe griping and tenesmus. In the commencement the febrile disturbance was in many cases not great. The disease appeared sometimes to consist in merely congestion of the mucous membrane of the rectum and colon in the initial stage, or in irritation; which states were, however, soon exalted into inflammation. There was great tenderness over the abdomen. No intermittent fever existed at the time of its commencement, and there was no evidence of its malarious origin. Indeed dysentery seemed to take the place of our usual endemic—and the few cases of the latter which came on toward the close of the epidemic were accompanied and aggravated by dysenteric symptoms. I was frequently reminded of the truth of that law of epidemics which compels all other diseases which appear during their prevalence, to "do homage to it by wearing its livery."—*Rush.*

The time of the invasion of this disease was generally in the night or early in the morning. This was to be attributed, probably, to the reduction of temperature during that time, and doubtless in many cases to the custom so common during the hot months, of sleeping with open chamber windows. There was no ground for

suspecting that a single case was produced by infection, notwithstanding the prevailing prejudice to the contrary.

After the first day when the symptoms in most cases only indicated the diarrhœal form, there were no fecal discharges until the disease abated. The stools consisted only of white mucous or jelly-like matter, showing either the entire absence of the secretion of bile or of its obstruction in its passage through the intestinal tube.

It is unnecessary to dwell longer on these details as I am not aware of any peculiarity in the general symptoms. They are nearly the same "semper et ubique." This brief and imperfect outline will be brought to a conclusion by a short sketch of the treatment which I adopted.

In those cases which would not bear the use of the lancet, the treatment was commenced by a full dose of calomel—and when there was only moderate febrile excitement, a grain of opium or what was generally preferred, 8 or 10 grains of pulv. ipecac. compos. When there was considerable heat of surface with a strong pulse, the lancet was employed, and in every such case seemed promptly to remove every difficulty. This could not, however, be always used, and then the mercurial dose was followed up by small doses (℥ij to ℥iv) of Glauber's or Rochelle salt, every two or three hours; the latter salt had become more *fashionable.* This plan was continued until there appeared some fecal matter in the stools. A full dose of Dover's powder was generally exhibited at bedtime to give the bowels rest. When the febrile action became reduced, a grain of calomel with 3 to 5 grains of Dover's powder every three or four hours during the day, alternated with doses of one of the above neutral salts.

The application of leeches was frequently resorted to, especially in children, the application of cups giving too much pain. These were followed by poultices of mush and hops which were found soothing and agreeable. Injections, where tenesmus was distressing, of starch, gum water or infusion of slippery-elm—and sometimes with the addition of plumb. acetat. and laudanum. A pill of three grains opium was found very useful when introduced within the sphincter, in diminishing the frequency of the stools and relieving tenesmus.

The use of calomel in this disease is a mooted point. In those latitudes where bilious fever is rare or unknown this may be a question. In this climate 38° to 40° N. L., experience has established its utility, if not its indispensableness. It is seldom given

more than two or three days before there is more or less appearance of bile in the stools. It is not necessary to carry it to the extent of producing ptyalism, which, however, if not appearing before the arterial action is reduced, is not injurious but rather beneficial by fully establishing the suspended biliary secretion.

About a hundred cases came under the care of the writer, two only of which proved fatal. In one neighborhood not very distant, where the epidemic prevailed, it was much more malignant, or the greater mortality was attributable to the use of castor oil in preference to the salts of soda.

For the following topographical outline of Frederick County I am indebted to my friend George A. Hanson, Esq., of Frederick City.

FREDERICK COUNTY

Is bounded on the north by Mason and Dixon's line, which separates it from Pennsylvania; on the south and southeast, by the Potomac to the mouth of the Monocacy, and by Montgomery County to Parr's Spring; on the east by Carroll County, and on the west by the Blue Ridge.

The Catoctin and Sugar-loaf Mountains are entirely within the bounds of the county—the former ridge commencing at the Point of Rocks on the Potomac and running nearly parallel with the Blue Ridge to the Pennsylvania line.

The region lying between the chain of the Catoctin and Blue Ridge is Middletown Valley, which from the earliest settlement has been remarkable for the exuberant richness of its soil. It lies on a substratum of limestone.

The principal streams are the Monocacy River and Tuscarora and Catoctin Creeks. The Monocacy rises in Pennsylvania, and flows in a course generally southward to the Potomac. It is formed by the confluence of Marsh and Rock Creeks, both of which rise in Pennsylvania.

The chief tributaries of the Monocacy are: 1. Piney Creek, rising in Pennsylvania, and passing near Taneytown, in Carroll County, falls into the Monocacy eight miles from the Pennsylvania line. 2. Tom's Creek rises in Pennsylvania, and, passing within a mile of Emmittsburg, unites with the Monocacy a mile below Piney Creek. 3. Big Pipe Creek rises in Carroll County, northeast of Westminster, and flows into the Monocacy three miles below Tom's

Creek. 4. Little Pipe Creek rises near Westminster, and empties into Big Pipe Creek a mile from its confluence with the Monocacy. 5. Owing's Creek, rising near the Blue Ridge, and breaking through the Catoctin Mountain two miles north of Mechanicstown, runs into the Monocacy, after passing north of Graceham, a mile or two below Big Pipe Creek. 6. Big Hunting Creek also rises near the foot of the Blue Ridge, and, flowing east, passes through the Catoctin Mountain at Mechanicstown, unites with the Monocacy four miles south of Owing's Creek. 7. Israel Creek rises near Liberty, and runs into the Monocacy three miles northeast of Frederick City. 8. Carroll Creek rises in the Catoctin ridge, near High Knob, and, passing through the city, empties into the Monocacy. 9. Linganore Creek rises in Carroll County, east of Liberty, and, passing between Liberty and New Market, runs into the Monocacy a mile north of the Baltimore and Frederick Turnpike. 10. Bush Creek rises five miles east of New Market, and, passing within a mile south of that village, runs into the Monocacy two miles below Linganore Creek. 11. Ballinger's Creek rises in the Catoctin Mountain, five miles west of Frederick City, and unites with the Monocacy a mile below Bush Creek. 12. Bennett's Creek rises in Montgomery County, ten miles northeast of Hyattstown, and, passing within two miles of that town, empties into the Monocacy six miles north of its confluence with the Potomac River. 13. Tuscarora Creek rises in the Catoctin Mountain, about seven miles north of the Potomac, flows southeast through Carroll's Manor, and empties into the Potomac two miles above the mouth of the Monocacy.—There are numerous smaller streams, from springs, which flow into the above-named creeks and the Monocacy; which, with its tributary creeks, all east of the Catoctin range, waters what is called Frederick Valley. On many of these watercourses are seated mills, tanneries, and various kinds of manufactories.

The streams west of the Catoctin Mountain, and which water the Middletown Valley, are: 1. Catoctin Creek, the principal of these, rises in the Blue Ridge, six miles from the Pennsylvania line, and flows southward, passing through the centre of Middletown Valley, a mile west of Middletown, and empties into the Potomac a mile or two west of the Catoctin Mountain. The principal tributaries of the Catoctin Creek are Mill Creek and Tobias Creek, both of which unite with the Catoctin below Middletown. 2. Little Catoctin Creek rises in the Blue Ridge, and flows into the Potomac River.

From this general view of the topography of Frederick County

it may be inferred that there are but few localities where the proper pabulum of bilious fever can be found. Intermittents and remittents are sometimes seen in the bottom-lands of the Monocacy and some of its larger tributaries; but, with the exception of these, and a limited district about the metropolis of the county, the face of the country is hilly and mountainous. All the valleys and the less elevated hills have a calcareous substratum. In fertility and salubrity, Frederick yields to no part of the State.

The general aspect of the country nearly resembling that of Carroll and Baltimore Counties, the epidemics are identical with those; and the reader is referred to the succeeding contribution of my friend and colleague, Dr. A. M. White.

Respectfully submitted,

P. WROTH, M. D.

CARROLL, HARFORD, AND BALTIMORE COUNTIES.

That portion of the State of Maryland comprehending Carroll, Harford, and Baltimore Counties, is situated in the northeastern part of the western shore of the State. Mason and Dixon's Line, celebrated both geographically and politically, forms its northern boundary. The Susquehanna River and the Chesapeake Bay bound it eastwardly; the Patapsco River and the Baltimore and Ohio Railroad on the south; and Pipe Creek, a branch of the Monocacy, whose waters fall into the Potomac, on the west.

The area thus included contains 1,535 square miles. It is about one degree east from Washington, and between thirty-nine and forty degrees north latitude. That portion of it which forms the shore of the Chesapeake Bay is but little elevated; as it recedes westwardly, the land rises until it reaches a height of about 300 feet above tide-water. In the western part of Carroll County is a very considerable elevation called "Parr's Ridge," or Southeast Mountain, traversing the county from northeast to southwest. This mountain forms the water-shed dividing the streams which find an outlet in the Patapsco, and upper part of the Chesapeake Bay, from those emptying into the Potomac. The whole of Carroll County, and a large portion of Harford and Baltimore Counties, are considerably elevated above tide-water; and are intersected by numerous streams, whose waters have a descent rapid in proportion to the altitude of their sources.

The surface of this region is very uneven, rising at short intervals into hills, and sinking into valleys with gently sloping sides. The

soil is generally rocky, and abounds in water-worn stones. It is therefore not very fertile naturally, but is susceptible of very great improvement by proper cultivation and manuring; it is better suited to the growth of the grasses than grains, though there are many farms that grow heavy crops of all the cereals. Grazing is, however, the staple agricultural pursuit.

The principal forest growths are oak, hickory, chestnut, poplar, beech, locust, maple, dogwood, ash, and cedar.

All the varieties of fruit common to this latitude flourish well, except peaches, which are short-lived and of inferior quality, owing to the coldness of the winters.

The water of this region is remarkably free from impurities, whether obtained from the streams or from wells and springs. There are mineral springs in various localities, chiefly of a chalybeate character, but containing in some instances lime, soda, sulphur, and magnesia.

This description is applicable to Carroll and to a large part of both Harford and Baltimore Counties; a portion of these latter, however, lying in the southeastern part of the section under consideration, on the shore of the bay, is low and flat, and the soil more or less sandy, with many swamps and ponds of stagnant water. In this part of Harford there are several rivers with large estuaries opening into the bay; they penetrate to a considerable distance inland, and receive the drainage of more than half the county. The water of these rivers, for some miles up, is salt; and the tide ebbs and flows in them to a point where the elevation of their beds equals the height to which the tide rises. Above, the water is fresh, and the current much more rapid than it is below.

The scope of country up to and for some distance above this point presents characters differing materially from the more elevated portions. The forest and vegetable growths, the properties of the waters of springs and wells, and the texture and constitution of the soil, differ from those higher up. The geological characters vary, too—the lower portion being within the limit of the tertiary strata, while the elevated country is upon the primitive formations.

In temperature, these counties do not vary materially, either in summer or winter, from places east of the mountains, similarly situated as to latitude; ranging in winter from 5° below zero to 30° or 40° above, and in summer from 50° to 95° of Fahrenheit. Changes in temperature are both frequent and great in all seasons of the year, a few minutes sometimes marking a rise or fall of the

thermometer of several degrees; in this respect being like the whole tide-water region south of the fortieth parallel of north latitude.

These sudden changes are not so frequently seen in the high as in the low situations.

Carroll, Harford, and Baltimore Counties contain a population of about 85,000 inhabitants. There die annually of this number about 800. The number of births is about 1,500. But it must be observed that these numbers can only be looked upon as approximations, the data being taken from the census returns of 1850. They show, however, a fair average of health, and compare favorably with other localities which boast a character of great salubrity. Here, as elsewhere, there occurs a greater mortality in the alluvial district than in that of the primitive formation; Carroll County, belonging to the latter, and having a population of 20,616, showing a mortality of only 168, or one death to 122 inhabitants; while Harford, a considerable portion of which lies in the former, with a population of only 19,356 inhabitants, shows a mortality of 246, or one death to 78 annually.

These proportions will generally be found to obtain in the region east of the Alleghany Mountains, between the low alluvial tracts and the more elevated or primitive formations.

An inquiry into the cause of this increase of mortality on low lands will show that it is owing to the prevalence of *malarial* fevers, a form of disease peculiar to alluvial tracts, and hardly known in its true type in more elevated regions; occurring annually, in a greater or less degree, in their own proper form, and possessing a power of impressing their likeness upon almost every disease coming within the range of their influence.

Now, to what cause is this form of disease to be attributed? It might at first sight be supposed, that since these fevers are found to occur oftener in alluvial tracts than upon primitive formations, that geological structure determined their existence, by some terrene emanations, the result of chemical changes brought about by the action of internal or external causes, in the tertiary strata. I am, however, in possession of no facts to strengthen this supposition. The exemption enjoyed by the primitive formations from malarial visitations seems to be exclusively due to their greater altitude, affording a freer circulation of air, a lessened humidity, and a somewhat lower temperature; conditions necessary to the evolution of a specific poison to which the name malaria has been given. This is as good a name as any other to express an unknown

morbific agent, and it will be time enough to use another when this agent shall be defined and localized.

That there is such an agent is plain; for, apart from the influence of diet, vigor of constitution, exercise of body or mind, and a variety of other conditions which, while they may influence and modify its action, and frequently indeed prevent it altogether, the occurrence of a particular form of disease in certain well defined localities, and at certain seasons of the year, testifies to the existence of a particular cause capable of producing it.

The opinion formerly held by all, and still maintained by some, that it is to be found in the decomposition of vegetable growths, is not worthy of credit; for, if such were the case, the world long ago would have been without inhabitants, since, by a law of nature, the growths of one year are the results of the decompositions of the preceding year or years. And, indeed, upon these results depends the life of every animal and vegetable upon the earth. This opinion arose from the fact that diseases of the character alluded to were most rife when vegetable decomposition was most rapid; but it was forgotten that, just at this season, the growth of plants was most rapid too, and, by a beautiful economy of nature, the separation of the elements of one plant did not take place faster than they were received into the structure of another.

Chemistry has detected no difference in the constitution of the air over low alluvial districts while malarial fevers prevail, and in that over elevated primitive regions where they are never known. Nor has there yet been found, in a state of mixture with it, any substance known to be capable of producing those diseases. Both caloric and electricity exist in atmospheric air in a latent state, but their amounts do not vary in high and low levels, nor materially in different seasons of the year; so that we may infer they play no important part in the production of malarial disease.

The density of the air as shown by the barometer in these localities, does not vary to an extent sufficient to be considered as a cause of lowland disease, but as modifying the action of the prime cause, and influencing, in a greater or less degree, the bodies of persons exposed to it; it is no doubt, in a measure, effective by its mechanical action, compressing the fluids when very heavy, and permitting expansion when lighter. Experiments with the air-pump, and the ascent of high mountains, show that such are its effects.

That temperature contributes to the production of this morbific

agent, there can be no doubt; for its effects are seen almost exclusively during the hot weather of summer and fall. But that a high temperature is not alone competent to its production is clear to every one; for we often see great heat neither accompanied nor followed by malarial disease. Sun-stroke is, I believe, the only disease that can be said, with certainty, to owe its origin to high heat alone.

While the hygrometric condition of the air is probably more effective in developing malarial germs than either of its other conditions, considered by itself it can have no such effect; for every one has seen great humidity continuing for some time without malarial disease; conjointly however with great humidity we rarely see high heat, without being followed or accompanied by many cases. And from this fact, some physicians of late years have come to the conclusion that this combination constitutes the great malarial agent. I do not, however, think so; for while intermittent and remittent fevers generally occur under such atmospheric conditions, yet such conditions do not always produce these fevers, which ought to be the case if they were their sole cause. Nor do I think that facts will bear out the belief, that certain terrene conditions arising from filth produced from the decay of animal or vegetable substances, added to great heat and high humidity, can constitute their cause; for these diseases occur in cleanly, as well as in filthy places.

Investigation must be pushed further still. The lurking poison has been traced to its threshold. From the preceding considerations it seems to me that it may be inferred that the prime cause of lowland fever is to be found floating in the vapor of atmospheric air; that it exists there in uniform or varying quantities at all seasons of the year, requiring for its full development great heat, and a high humidity; and that the reason why its effects are chiefly seen in low alluvial tracts is found in the fact that these are precisely the localities where the greatest heat and highest humidity are found—conditions necessary to its complete development. And I think that philosophical research will yet detect it by a more complete and perfect analysis, not of atmospheric air, but of the vapor floating in it. To this search, however, must be brought the profoundest chemical knowledge and the nicest possible tact. He who makes the discovery will be entitled to the honor and gratitude of mankind; for with it, will probably be found the means of preventing its effects.

In a portion of the territory under consideration, extending from North Point, the southernmost limit of Baltimore County, to Havre de Grace, in Harford County, along the shores of the Patapsco and Susquehanna Rivers, and the Chesapeake Bay, as before remarked, the land is low, and its geology and geography both differ from the more elevated northwestern portion.

It is in this section that malarial fevers prevail epidemically, to a greater or less extent, every year. Their time of incursion is generally about the middle of July; and their duration, three or four months. They take on either intermittent or remittent forms, and are of every grade of intensity from the fever of one day's duration, to that whose fourth paroxysm is generally fatal.

This variety of effect is owing to the varying susceptibilities of those exposed to the action of the poison. There is no class of diseases truer to its type than malarial fever. Intermission or remission is their never-failing characteristic; and, by this trait, the physician cannot only recognize them, but can also detect their lurking influence over other diseases. Neither infancy, nor very old age, is so liable to be affected by this disease, as the middle periods of life; owing probably to the fact, that the extremes of life are less frequently exposed to atmospheric changes, than those in its middle stages, upon whom are imposed its duties and burdens.

As to the treatment of these fevers, but little need be said here. There are no diseases more completely under the control of medicine, or in which the triumph of science is more manifest. Quinine, in their uncomplicated forms, will always cure them, if given in time, and in proper quantity.

Dysentery occurs annually in both the high and low portions of this section of country; though, so far as I am informed, not more frequently, or to a greater extent in the one than in the other. In some seasons it assumes the epidemic character, when many cases occur; and, in others, it is only occasionally seen. Its time of incursion, according to my experience, is either earlier or later in the year than malarial fevers. When preceding them, dysentery is of a strictly inflammatory character, and must be treated by remedies suited to reduce inflammation; but, when coming on either during the prevalence of a malarial epidemic, or a short time after its cessation, reference must be had to malarial complication; or their cure will be found to be very tedious, and often impossible.

Judging from published mortuary reports, the mortality of dys-

entery, in this section, does not appear to be so great as in some other places.

The diseases most prevalent, in the elevated portions, are of an inflammatory character; chiefly affecting the respiratory function and organism. They are seen in every form, from simple congestion of the nasal membrane, to complete consolidation of the lungs; sometimes occurring singly, and at other times, taking on the form of an epidemic.

When diseases of this character are found to affect many persons at the same time, by closely observing their symptoms, it will often be found, that the fever accompanying them, has a periodic tendency, more or less marked. This is especially the case in bronchial affections, and indicates, as I think, a feeble action of the malarial poison, which not in amount sufficient to produce intermittent or remittent fever, has expended its force in modifying the existing epidemic.

I have come to this conclusion, from observing the curative power of quinine in their treatment. After having used a variety of other remedies, to no purpose, a few grains of this potent medicine has, as if by magic, restored the patient to health.

And, there is no doubt, that the severer forms of pulmonic inflammation are modified in the same way, and similar results will follow the judicious use of this remedy.

In such cases, the physician who frees himself from the notion, that quinine being a stimulant, must increase congestion, and heighten inflammation; and who, after carefully observing the manner of the disease, combined in due proportion, some mercurial with quinine, will effect more cures than those who rely solely on vomits, purges, and the lancet.

The extensive prevalence of catarrhal fever over large districts of country, is, no doubt, to be attributed to the presence in the air, of some subtile poison, which has, as yet, eluded the observation of men of science. It does not seem to be dependent upon any known atmospheric conditions, whether of weight, temperature, or moisture; nor upon the amount of ammonia or carbonic acid gas, found in a state of mixture with it. Its varying electrical states have not been sufficiently studied hitherto, in reference to this matter, to determine whether they are influential or not; though it does not seem unreasonable to infer, that they may be, when it is remembered how powerful are the effects of electricity, in a concentrated form, and under favorable circumstances.

Under the name of *influenza*, this complaint often prevails to a very great extent, bringing under its influence almost every person in districts where it makes its appearance. The general tendency is towards recovery; running a course of from one to six weeks, of more or less severity; and resisting often the most orthodox plans of treatment, as well as the host of domestic remedies, which, as is stated, were never known to fail before. Sometimes the fever takes on a bad character, especially where from natural weakness, or previous disease, the power of resistance is impaired.

Such cases may prove fatal, and require the best judgment and skill of the physician in their treatment.

In my own practice, after having tried a variety of medicines, I have found excellent results to follow the free use of a decoction of flaxseed in good cider, to be taken in such quantities as may be agreeable to the patient. The demulcent property of this drink is, no doubt, of good effect; but to the acid of the cider, freed, as it has been by boiling, from a part of its stimulating ingredient, and retaining only its sugar and acid, must be attributed the chief value.

Probably an equal number of cases will be found to occur in high and low situations; but of greater severity and more difficult to manage in the former than in the latter; for in accordance with a fact alluded to before in malarial districts, this complaint, when assuming a violent aspect, generally takes on a periodic form, sometimes obscure and at other times well marked. The proper remedy here is quinine, which properly given will in most cases effect a cure. It seems as if the malarial poison had smothered out the prime disease, and left the physician only itself to deal with.

Pneumonia is far more frequent in the upper than in the lower portion of this district; but it is at the same time more manageable; for while the grade of the inflammation is more intense, there are fewer complications, and on this account more submission to proper treatment. In this unmixed form, as long as any air can find access to the inflamed part, although there may be a considerable amount of fibrinous deposit on the interior surfaces of the air-cells—bloodletting, pushed to such an extent as that the pulse shall show an enfeebled action of the heart, will in most cases put a stop to this disease. In the use of this remedy it is important that the stage of the disease be accurately determined; for it becomes of doubtful efficacy when consolidation has taken place; and this more especially when a large part of one or both lungs is

its seat. It often happens that the patient is walking about, and unaware of his peril during the first stage; and the physician is not summoned until the time has passed when the lancet could have been used with success. His resort then must be to mercury, which will rarely disappoint him, aided by blisters, opiates, and such other means as the state of the case may require. If there be a malarial complication which in general is easily detected by faint febrile remissions, quinine must be added to the mercury to reduce the disease to its simple form, and bring it within reach of the remedies denoted against the inflammation. *Pneumonia biliosa* is the name given to this complication. It is sometimes extremely prevalent, chiefly in the low districts; occurring oftenest in the fall, and beginning of winter. This is a very bad form of disease, and is frequently fatal, from the debilitated state of those in whom it is seen; its subjects being persons who have recently had malarial fever, or who have been weakened by intemperance or other causes. There are but few cases in which bloodletting can be used. From the very onset of the disease, a want of vital energy is apparent, and the little that remains must be husbanded, while the disease is combated with blisters, mercurials and quinine.

It has been long noticed that tubercular deposits in the lungs, are of less frequent occurrence in malarial districts than elsewhere; and it moreover rarely happens that persons, laboring under *phthisis*, especially after hectic fever has declared itself, indicating a softened state of the tubercles, are brought under malarial influence. It is impossible to account for these facts in a rational way. Their truth, however, being well established, physicians have inferred an antagonism between the two morbific causes. And in the hope that the tubercular element, might in some inscrutable way, be destroyed by malaria, have been in the habit of sending their consumptive patients into malarial districts; but with the almost universal result of adding to the discomfort of the sufferer, and often, indeed, of hastening his death; not from any bad effect of the climate, but by depriving him of the comforts of home, and the society of those who love him, which, in the rapidly waning hours of his life, are his only stay.

From observations made upon the frequency of the occurrence of consumption in high and low districts of country, I have concluded that there are one-third more in the former than in the latter; and think many persons in whom the predisposition to this is very strong, might altogether escape, by removing to a malarial

district, before any of the physical signs of phthisis were manifest.

As a means of relief from the distressing irritation consequent upon this disease, it will be found that a small blister, applied as near to the axilla of the affected side as it can be, without impairing the motions of the arm, and frequently removed, is often very serviceable. And unguents, composed of anodyne ingredients, seem to have a more composing effect, when applied in the axillæ, than when rubbed on the anterior part of the chest.

Rheumatism is another disease common to this region. I have never known it to assume a strictly epidemic character, though it is much more frequent in some seasons than others. The acute variety is found oftener in the elevated territory; while the chronic is more frequently seen in the lower districts. If it be entitled at all to the character of an epidemic, it is under the chronic form, for it is not uncommon to see malarial epidemics passing off at the close of autumn in the shape of chronic rheumatism.

Acute rheumatism owes its origin to defective nutrition, brought about by errors of diet and improper exposure to great atmospheric changes.

What is sometimes called rheumatism does now and then seem to take on a periodic form, or it may be alternate with an intermittent. And it is not uncommon to see an intermittent, suddenly and without apparent cause, change itself into a periodic pain; as in hemicrania. But this is not rheumatism; it is an intermittent with an attempt at concealment. A few grains of quinine, or a little of Fowler's solution, will at once cure it. The same remedies, however, will not cure genuine chronic rheumatism; and, indeed, I do not know what will. The faculty have advised "patience and flannel," which are no doubt very good; while a celebrated divine has spoken highly of "sulphur and supplication." It would not be amiss in the treatment to try both plans.

Scarlet fever has prevailed to considerable extent for the last few years. It is generally first seen in the fall of the year, continuing during the winter, and until late in the spring. Very hot weather in the region under consideration checks its progress; while further north, though lessened in frequency and violence, cases of it are found occurring at all seasons of the year. In higher latitudes too, when assuming the epidemic form, it attacks a much greater number, leaving, indeed, but few of the younger portion of the population, who have never had the disease, unaffected. Probably

not more than one fourth of all the children under twelve years of age here, are attacked by scarlet fever, although living within the range of the disease, so far as atmospheric causes are concerned. And I have seen children of the same family, some taking it and others remaining free. It may be, however, that they came under its influence, but so slightly, as not to interfere with their general health to an extent to be noticed. In the more elevated portions of the country, the disease assumes a worse form, and more fatal cases occur, than in those of a lower level.

That this disease is contagious there can be no doubt; but its law of contagion is subject to more exceptions than any other disease of a like character; so much so, indeed, that some observers have denied to it any specific contagion at all. And certainly some facts in my own experience would seem to tend to this conclusion. But the mass of evidence is on the other side. It does not seem difficult to account for the frequent exemption from attack in cases of undoubted exposure to its influence. There is no disease whose variations of intensity equal those of scarlet fever. There shall be a family of five children, all of whom are exposed to the contagious influence at the same time, and, as nearly as we can judge, under the same bodily conditions; one will have the disease and die, another barely escape with life, a third be confined to bed only a day or two, a fourth with just enough of the symptoms to mark the disease, and the fifth show no signs of it whatever. This state of things occurred in my practice some years ago; and although scarlet fever has occurred in the neighborhood since, and the little boy who escaped the disease was exposed to its influence, yet he was not affected by it, and the probability is he never will have it. The explanation that suggests itself is, that while the morbific influence was not powerful enough to cause, in his case, a departure from health, it had yet sufficient force to insure him against its attacks in future; and an inference that those persons who, though exposed to the contagion of scarlet fever, do not take it, have, at some former period of their lives, been secured against it in the same way.

The poison of this terrible disease concentrates itself upon the mucous system of vessels, and they fall at once into a state of torpor, almost indeed of paralysis. The capillaries of those mucous surfaces which we can see are gorged with blood, and its passage through them very languid, as is shown by pressure on the skin, the tongue, and the fauces. The function of these surfaces being depurative, a failure in their action involves such an accumulation

and retention in the blood of effete material, that its nutritive properties are impaired, and but abortive attempts are made at reparation, while all the other organs are, as it were, deadened, by being supplied with impure blood, as we see in the frequent occurrence of coma. It is therefore no wonder that, in an aggravated form, scarlet fever should be a mortal disease.

I am inclined to the belief that the belladonna is not entitled to its reputation as a preventive of this disease, although I always order it to be taken during the prevalence of the epidemic, in doses not sufficient to show its specific effect. It is but fair to state, however, that in some families those children who took this medicine did sometimes escape, while all the others who did not take it had the disease. But these results are not invariable, and only sufficiently frequent to suggest such a trial of the remedy as shall put the question at rest.

As to medical treatment of scarlet fever, I have nothing of importance to offer. Looking upon it as a disease in which the forces of life are from the very onset greatly enfeebled, I have endeavored to strengthen and sustain the patient by such a diet as would contribute most to this end, and by giving quinine in the form of the supersulphate, with the hope that the excess of sulphuric acid in this, as it does in some other forms of disease, might have the effect of enlivening the cutaneous secernents. To say the least, as many recoveries will take place under this plan of treatment, where the disease is of a violent character, as under any other. In its milder forms, good nursing is better than medicine.

There does not seem to be any natural relation between *measles* and scarlet fever, and yet it frequently happens that these two diseases occur together. At such times, measles will be seen to affect the younger children and scarlet fever the older. It is not difficult to distinguish between the two, the only symptom they have in common being the eruption, which presents points of difference enough to avoid error. In 1854 measles prevailed very extensively, in an epidemic form, over this section of country. It appeared in the spring of the year, at short intervals apart, in different places, and, gradually widening its circle of influence, spread until it became general. Its duration was about three months, during which time most of the children, as well as many adults, were affected by it. In general it ran its course without much danger to the patient, and there were but few fatal cases. A rather unusual complication in this epidemic was diarrhœa upon the disappearance of the eruption,

which was generally easily checked by gentle astringents. In some parts of the State, however, cholera in a most violent form was ushered in by the diarrhœa, and many persons were carried off by it.

To this complication reference has been made in another place.

In the treatment of measles, non-interference is the best policy, as the disease always has a tendency toward recovery. When complications occur, the treatment must be such as they may require.

I do not think that in this section of country, *typhoid fever* has ever grown into the dimensions of an epidemic, though it is sometimes quite prevalent. From errors in diagnosis, many diseases of low type, occurring in weakened habits of body, are called typhoid fever, in which there are none of the specific traits of the disease; and thus erroneous conclusions as to its frequency are arrived at.

From the most careful observation I have been able to make, this fever is owing to a specific cause, and that animal, in its origin. Its contagiousness, in the open country, is very doubtful; while in thickly peopled cities, amidst filth and destitution, and the mental depression consequent upon them, and upon other conditions belonging to city life, there can be no question that it is contagious. It is, moreover, a more fatal disease in cities than in the country, owing to the more intense action of the producing cause, as well as a lessened power of resistance.

I have not seen a case of this disease in a patient under twelve years of age, nor over fifty. The majority of the cases were males; but the mortality was greater in females, in proportion to the number of cases.

The plan of treatment that seems to be best adapted to this disease in its unmixed form, is one that will sustain the powers of life, and enable the patient to bear up under it till its course has been run. With this object, I have generally ordered quietude, cleanliness, and such a diet as, while it would strengthen, would not oppress the patient; and only given those medicines that would keep the nutritive function in proper condition. Where complications occur in the course of the complaint, the physician must suit his remedies to the existing state of things.

The above enumerated diseases are, I think, all that may with strictness be said to be *prevalent* in Carroll, Harford, and Baltimore Counties.

In consequence of the want of meteorological and mortuary statistics in these counties, I have made no allusions to these parts of

the subject, and the foregoing remarks are of course very defective without them.

A. M. W.

February, 1857.

TOPOGRAPHY AND EPIDEMICS OF BALTIMORE.

BY EDMUND G. WATERS, M. D.

The city of Baltimore, by general admission, is the most picturesque in the United States. It is indeed "set upon a hill," forming a gradual slope from the northeast branch of the Patapsco River, and attaining at the outskirts the height of 223 feet. The general elevation of the ground on which it stands is broken into gentle undulations, thus allowing the filth which would otherwise collect in great quantities, to be thoroughly washed out by every hard rain. It is owing to this fact, in all probability, that Baltimore has enjoyed, for so many years, that remarkable exemption from the pestilent epidemics which have decimated the population of other cities on the Atlantic border and elsewhere, thereby gaining for herself the enviable notoriety of almost perpetual healthfulness.

In the stagnant waters of the basin and docks into which the sewers disembogue the noxious drainage of the whole town, we might naturally look for a local and perennial source of disease. Nor should we, upon close examination, be disappointed. In the alleys which penetrate the lower sections of the city we continually find the sure marks of such infection in the cases of typhous and bilious fevers, which, in their appropriate season, prove very destructive to the lives of that squalid and miserable population which teems within them. This condition of things is relative, however, only to the almost absolute exemption from such diseases which the higher parts of the town enjoy, and is out of all proportion to the mortality which, in Philadelphia and New York, has made infamous districts similarly situated.

The Patapsco River, rising many miles to the northwest of the city, debouches some fourteen miles below into the magnificent estuary of the Chesapeake Bay. Jones's Falls, and Gwyn's Falls, two turbulent streams in the rainy season, also have their sources far to the northwest; and finally, after traversing about thirty miles of country, empty into the Patapsco at the southern edge of the city. These streams supply water-power to a number of mills and factories at various distances along their course, and from the for-

mer is derived the largest amount of water consumed by the inhabitants.

There is an extensive marsh along the southern border of the city, formed by the sudden expansion of Gwyn's Falls at their mouth, and extending perhaps two miles. This low country is, however, yielding rapidly before the advance of enterprise and improvement, and to a great extent promises ere long to be numbered among the antiquities of the city. Indeed, some of the lower streets, now teeming with mercantile energy and life, were once in the same condition, and sections now beautified by stately warehouses, were once overgrown with cat-tails and bulrushes.

Baltimore has been remarkably healthy throughout the past year, and practically falsified the too confident predictions of over sanguine physicians that 1856 would wrap her citizens in sackcloth, and fill their pleasant houses with mourning. The yellow fever, by the blessing of a benignant Providence, has failed to visit her for a long series of years; nor am I aware that any well authenticated case has been established to have occurred during its recent awful visitation at Norfolk or elsewhere. We always have some bilious fever during the summer and autumn in certain sections arising from those local causes to which I just now adverted. The violence with which the poison occasionally acts upon the economy, now and then gives rise to a congestive phase which, here as everywhere, is difficult to manage, and not unfrequently proves fatal.

The practice chiefly adopted in ordinary cases of bilious fever, that is, in those cases where there is no marked tendency to congestion, is, to begin treatment by the exhibition of an emetic. The action of this remedy most generally alleviates the more violent symptoms—headache, sick stomach, and fever; unloads the liver; diminishes gastric irritation; produces a decided determination to the surface throughout the body; and facilitates, in a remarkable degree, the beneficial action of subsequent remedies. I have frequently observed with astonishment, the comparative inertness of cathartics where emetics had not been used, and their surprising energy when following them. Blue mass combined with rhubarb and compound extract of colocynth, is our most approved agent in this complaint, though some practitioners prefer calomel to the pil. hydrarg., especially when there is a severe type of the disease to deal with. These remedies appear to combine the necessary aperient properties with the alterative, and first stimulating the liver to increased action, gradually move the morbid secretions from the bowels. My

favorite prescription is, to combine one grain of blue mass with two of colocynth and rhubarb, in each pill, to be repeated every two or three hours, until five or six pills shall be taken.

The congestive form of the disease is always more difficult to treat. Its inception is various—dating at one time from the commencement of the attack, and at others at any period of its progress. It always constitutes a grave complication. A common plan of treatment is topical depletion by cups or leeches, followed by blisters, and accompanied by large and frequent doses of sulphate of quinine, sometimes combined with carbonate of ammonia. A professional friend of mine informed me that his own life, in the estimation of his physicians, was saved by the hourly exhibition of ℈j doses of quinine, until he had taken more than a hundred grains. There appears always a great insensibility to impression on the circulation in this disease—and although I adopt fully Dr. Wood's theory of disordered innervation as producing it, yet local depletion has appeared to me an excellent adjuvant to the proper action of internal remedies, upon a similar principle, to that which prompts the use of cold ablutions to the head, to assist emetics after the swallowing of narcotic poisons. The constitutional treatment differs not materially from that suggested above.

Typhus Fever.—Our typhus fever is commonly in its earlier stages a sthenic disease, and bears the lancet well. Bleeding is however seldom employed for other purposes than to prevent threatened inflammation, or assist the action of internal remedies. I have never known it to shorten the disease in the recovery of the patient.

Typhus fever seldom originates here. As Baltimore is a port of entry, the wretched and diseased occupants of the forecastle, among foreign emigrants, often escape the quarantine regulations, established as a safeguard to the inhabitants of our cities—and when ashore, yielding to the effects of long confinement and miserable diet, are seized with the disease, and propagate it to others in their neighborhood. In this way we sometimes have cases of ship-fever, but the cause, in my opinion, may, for the most part, be traced to importation.

One eminent gentleman in the profession, in our city, thinks typhoid fever as absolutely under the control of quinine as intermittents. He speaks of his almost uniform success in its use, but I have not had the same satisfaction from the remedy, nor heard it

so highly commended by others. As a general tonic and stimulant, quinine is invaluable in continued fevers, where the head will bear it—but so far as I have observed, it has never appeared to shorten the attack.

SCARLATINA.—The indication for treatment in scarlet fever, here and everywhere, is, to obviate the great tendency to sink, where the disease is at all severe, usually manifested from the first. Stimulants seem admissible from the very beginning, to prepare the system for the coming struggle, and to assist it in treasuring up strength for the more advanced stages of the disease. Where there is a sudden and violent tendency to swell about the glands of the throat, it may frequently be avoided by the application of blisters; while in cases not marked by such peculiar energy, a plaster of camphorated mercurial ointment will answer every purpose.

The scarlet fever has paid us, in the winter just past, its annual visit. Its prevalence here, is not, however, comparable to what it was in Boston and New York. Nor, indeed, has its appearance been marked by the disastrous fatality, with which it ravaged those cities. Although the cases have been more numerous this season than at any former time, there has been a marked decrease in the number of deaths. This seems to be attributable to the mild form which characterized the complaint, rather than to any radical change in the treatment.

From what I have been able to learn from my brethren in the profession, their practice has not varied materially from the prescribed system—nor can I find that the new theory of belladonna has made any considerable progress among them.

MEASLES, as I before observed, have been so uniformly mild this winter as to require simply to be left alone.

PNEUMONIA.—The lancet is, for the most part, admissible in our pneumonia and bronchitis in their acute form. I have known, however, that singular typhoid feature to accompany the disease, which has baffled the skill of the profession from Bangor to New Orleans, in which bleeding was but the prelude to rapid and inevitable dissolution. We have not had this type of the disease here for several years—and before that period, not within my memory. I have had to encounter it elsewhere,[1] however, in its most virulent form, and

[1] In Somerset County, on the Eastern Shore.

consider it the most uncompromising and malignant disease the physician can ever be called upon to combat.

CONSUMPTION.—The weekly bills of mortality show a marked diminution in the number of deaths from that fell destroyer—consumption. This fact is referable in all probability to the continued character of the weather, which, during the past winter, has undergone fewer thermometrical and hygrometrical changes than are usually seen in our climate, in that season. Some of our physicians are beginning to adopt the theory, that consumptives fare better in an atmosphere regularly cold and dry, than in that which is warmer—such an one, for instance, as Havana. This question, however, must be left for time and future observations to settle.

There have been fewer cases of croup, this winter, than I have ever known. This exemption is clearly owing to the great cold which has effectually closed the doors against open-air enjoyment and exposure of children. Joined to this fact, is the remarkable dryness of the air, and the prevalence of northwesterly winds. We had but few of those days significantly called weather-breeders, which may be termed so many premiums offered by him of the pale horse, upon the lives of our juvenile population. The cases of pneumonia and bronchitis have also been rare from the same cause, nor have they commanded the attention of the profession previous to the melting of the great snow, which wrapped the earth in vapor, and bore heavily upon the lungs.

We have other diseases, to be sure—but those above mentioned are all that seem to me to deserve special attention.

The temperature in the month of June, 1856, averaged above 80° Fah.; observations being taken at 12 M., in all cases. There was much rain, in the ratio of one day in four.

July. The average was higher—about 85°—for the most part clear.

August was singularly equable, average 74°, rising but once as high as 78°.

September descended in the scale, having an average of 69°, a cool and clear month.

October averaged 62°, for the most part clear weather.

November came down to 46°, average, for the most part, clear.

December averaged 38°—windy, with a quantity of rain.

1857. January averaged about 18°—one deep snow, several slight

dashes, with occasional rain. For the most part clear and excessively cold.

February rises considerably higher, attaining the average of 46°, generally clear, and milder than the same month of last year.

E. G. WATERS, M. D.

BALTIMORE, Feb., 1856.

REPORT

ON

INFANT MORTALITY IN LARGE CITIES,

THE

SOURCES OF ITS INCREASE,

AND

MEANS FOR ITS DIMINUTION.

BY

D. MEREDITH REESE, M. D., LL.D., &c.,

OF NEW YORK.

INFANT MORTALITY IN LARGE CITIES; THE SOURCES OF ITS INCREASE, AND MEANS FOR ITS DIMINUTION.

THE terms of the question thus submitted to the undersigned, very clearly imply—

1st. That the mortality of infancy, especially in large cities, has reached an *extent* of magnitude which demands inquiry into its causes and remedies by the medical profession.

2d. That infant mortality in large cities is *increasing* to a degree which renders it important that the sources of such increase should be sought by diligent investigation.

3d. That the *means of diminishing* the extent of the mortality among infants and children of tender age, while their discovery and adoption would greatly subserve the interests of humanity, would at the same time redound to the honor and usefulness of our profession, and contribute to the public welfare.

Upon each of these topics, it will be the object of this paper to remark very briefly, by presenting observations of a practical character, derived from experience and observation, together with such inferences as may be legitimately deduced therefrom. The presentation of the literature of the subject will be foreign from the purpose of this paper, as this alone would extend beyond the limits we have prescribed to ourselves. For the same reason, we omit any extensive introduction of statistical and numerical tables, lest these should derogate from our design to render the effort suggestive and practical, capable of elaboration and amplification hereafter by others.

First. By "infant mortality" we understand the *mortality of childhood*, or, in other words, that fearful item in our official bills of mortality and reports of interments, which records the appalling fact that nearly ONE-HALF of the *whole number of deaths*, especially in large cities, occur in infancy, and before the subjects have reached

the *fifth anniversary of their birth.* In the city of New York, as will appear by the accompanying statistical table, the whole mortality of the last half century amounted to 363,242 (including the still-born) while the number of deaths *under* 5 *years of age* are shown by the same table to have been 176,043, which is nearly 49 per cent. of the entire mortality of the city, and this for 50 consecutive years. As in New York, so in other large cities, the proportion of infant mortality will be found to vary inconsiderably if at all, so that it may be safely estimated that one-half of the population enumerated in the census die before the age of five years; and hence the annual infant mortality includes little short of a *moiety of the human race*, unless it can be shown to be greater in our large cities than through the country and through the world. But of this hereafter.

Of the fearful *increase* of infant mortality in New York, regarding this as a type of other cities, we have the testimony of the same statistical table. In the year 1853, the deaths under 5 years numbered 12,963, while in 1843 only 4588 such deaths occurred, showing the appalling increase of 8375 within 10 years, which is vastly beyond the proportional increase of the population of the city during the decennial period, as shown by the census. Moreover, this increased infant mortality in 1853 as compared with 1843, is in a ratio very far beyond that of the aggregate of the deaths in persons of all ages, in each of these years respectively, found in the same table. The deaths under 5 years in 1853 were 12,963, while the deaths of all others in the city of every age numbered only 9739; so that the *infant mortality* exceeded all the other interments for that year by 3224! This single fact exhibits in a striking light the importance of the subject of infant mortality in view of its frightful extent, and its alarming increase within 10 years. In 1843, the infant mortality exceeded the half of the aggregate mortality of the city by only a few *hundreds;* but in 1853, the excess over one-half the entire number of interments of all ages in the city reaches as many *thousands.*

These particular years have been selected only because the semi-centennial table from which we quote includes the 50 years ending in 1853, and because it was only in 1843 that the City Inspector was by law empowered to record all the deaths occurring in the city, irrespective of the place of their interment, and hence from this latter date he vouches for the reliability of the table. The mortality for 1854, '55, and '56 is appended for comparison, thus bringing our data down to the present year. Other corroborative tables, as those

of Drs. Emerson and Condie, of Philadelphia, Dr. Lee and others, may be found in the books, and are too familiar to the profession to be reproduced here. They all show the enormous extent of infant mortality, and its amazing increase, the latter being a fact peculiar to our American cities, for in the great cities of the old world the mortality of infancy has been annually diminishing for many years.

This single fact exhibits in a striking light the vast importance of our inquiry. Why should infant mortality in American cities be greater than even in Paris! 8 per cent. above Glasgow, 10 per cent. above Liverpool, and nearly 13 per cent. greater than in London? Why should it be increasing here and diminishing there? And this too when statistics abundantly show the mean duration of human life to be greater by 3½ per cent. in our American cities taken collectively than in the cities of Europe? Whether we shall be able to point out the reasons for this remarkable disparity or not, by demonstrating that there are other sources and causes existing and operating here than in transatlantic countries, the fact remains that infant mortality has attained gigantic proportions among us, and is increasing with amazing rapidity; and this too when the general salubrity of our climate, and the facilities for sustaining and preserving life with us, are superior to those possessed by any country on the globe.

Having thus succinctly shown the *extent* and the *increase* of infant mortality in the largest of our Atlantic cities, and hence inferred a similar state of facts elsewhere; it will now be in place to inquire after the causes of such extent, and to seek for the *sources* of such increase. We pause however to premise, for reasons which will be hereafter apparent, that we include among the infant mortality all those recorded interments marked as stillborn and premature births, the extent of which, and especially their amazing increase, constitutes one of the most revolting and yet one of the most important features of our inquiry, and one which cannot be contemplated without horror. Let it suffice for the present to say, that during the last 50 years, this New York table reports no less than 24,164 among the stillborn and premature birth interments. And while in 1843 only 760 of this class were recorded, in 1853 no less than 1930 are reported—an *increase* of 1170, which is nearly 140 per cent. of increase within ten years!

It will be perceived that these "stillborn and premature birth" interments number equal to *one-fifth* of the entire infant mortality

of the last half century, and hence ought not to be overlooked in any estimate made upon this subject. Apart, however, from their numbers, they must be included for another and a weightier reason, since the causes of mortality among children of tender age are, in a multitude of cases, to be found only by extending our inquiries to their *intra-uterine* life, and the physiological state of the parents, but especially the sanitary condition of the mothers, their hygienic and moral habits, and circumstances. Nothing can be more certain than that the viability of the infant after birth, and its tenacity of life, depend very greatly upon the condition, circumstances, habits, and health of the parents, particularly those of the mothers, during every period of pregnancy. And hence pathological and demoralizing agencies, operating upon parents in reproduction and during utero-gestation, are often the sources of "premature birth and stillborn" cases, but not less the cause of early death in their offspring after birth, and resulting in a vast proportion of the infant mortality so sadly and universally deplored. These considerations may suffice to justify our plea for including the stillborn interments among the victims of infant mortality.

In contemplating this subject, we shall find it difficult to believe that the inestimable jewel of life is given by the Creator to such myriads of our race, with the design that a large majority of those who receive this boon are destined, in the Divine plan, to perish during their fœtal or infantile existence, and that he has left us without any remedy to avert so terrific a catastrophe. Indeed, from what we know of the wonderful viability, and mysterious tenacity of life which characterizes infantile existence, both intra and extra-uterine being, we should infer the contrary; and believe that the benevolent Father of all has other and wiser and better designs towards our race, purposes which are perverted or defeated by a violation of the laws of our being, whereby the children whom God has given us as a blessing, become a curse by our early bereavement, and they perish prematurely, the victims of our ignorance, our misfortunes, our follies, or our crimes. Let us then enter upon an examination of the causes of infant mortality, and inquire why it is, that more than half the children born in our large cities are numbered with the dead at their very entrance into life. Renouncing the idea of irrevocable fate as the source of this fatality, let us seek for its source in our own public and private disregard or trespass of the laws of health and life, both in relation to ourselves and our children.

First, then, let us look at the cases of "stillborn and premature birth," which constitute so large a proportion of infant mortality. The causes of these are well understood by the profession, when occurring from hereditary and constitutional vitiation of blood in either parent, from contingent morbid agents acting upon the body or mind of the mother, and from incidental or accidental events occurring during pregnancy and parturition. But it is equally well known to all medical men, that from all these causes combined, such cases are *rare* compared with the number of births under professional management; and moreover that they bear *no proportion whatever* to the astonishing records of the interments from this cause. Let any man compare the stillborn cases with the numbers of living children born in any of our hospitals or asylums for lying-in women —and these mothers are often the most unfavorable cases of maternity—and he will discover how rare are the stillborn or premature cases. It is plain, therefore, that their extent and increase in various classes of society are due to other causes. Without entering into any unnecessary detail upon this delicate and ungracious topic, it may suffice to allude only to the ghastly crime of abortionism, which has become a murderous trade in many of our large cities, tolerated, connived at, and even protected by corrupt civil authorities, and often patronized by newspapers whose proprietors insert conspicuously the advertisements of these male and female vampires, for a share in the enormous profits of this inhuman traffic in blood and life. These murderers, for such they are, are well known to the police authorities; their names, residences, and even their guilty customers and victims are no secret to the authorities; they have their boxes at the post-office, loaded down with their correspondence and fees; take their seats at the opera; promenade our fashionable thoroughfares, and drive their splendid equipages upon our avenues in proud magnificence, while the "blood of the slaughtered innocents" is crying against them for vengeance.

Fidelity to the truth constrains this allusion to a topic which else it were "a shame even to name;" but the worst is yet untold. There are fathers who employ and pay these wretches, and, alas! there are mothers who become their victims, and voluntarily sacrifice their unborn infants, and hazard their own lives in the criminal process. Would that it were only the profligate, or even the unfortunate of their sex, whose guilty fear or shame thus seeks to hide the evidence of illicit amours. But the proof is overwhelming, and everywhere known to the profession, that even the married, to

postpone the cares of a family, the perils of parturition, the privations and duties of maternity, and sometimes in view of the pecuniary burdens they apprehend as intolerable, consent to the use of drugs, and even the employment of instrumental and other means, to arrest early pregnancy, and to produce premature delivery, persuading themselves into the vulgar fallacy that there is no life before quickening, and that early abortionism is therefore less than murder. That such means are often used unsuccessfully, and are thus brought to the knowledge of medical men in time to repair and prevent the mischief, is a proof of the fidelity of nature in preserving the viability of the infant even under adverse circumstances. But that such often succeed, always by jeoparding, and sometimes by destroying their own lives, is notorious. And that very many "premature births and stillborn children" are the result of mischiefs inflicted upon mother or child or both, by awkward or unskilful attempts at abortionism, can neither be denied nor doubted. It is humiliating thus to record the wide-spread prevalence of an evil scarcely known to the generation of our fathers. The object of the institution of marriage, viz., the birth and nurture of offspring, the sacredness of the family relation, and all the sanctions of virtuous love in the conjugal and parental relation, seem to be ignored in these degenerate days, and need to be revived in the public creed and practice. It adds to the melancholy aspect of this subject when we record our conviction, that not merely the stillborn, but much of the mortality of early infancy, results from the injury inflicted upon mother and child by the unnatural and unsuccessful attempts made to prevent conception, and during pregnancy to procure abortion. The same effect is produced in other cases, without any criminal intent, by drugging or "doctoring" women in various ways, while pregnant, under the real or imaginary ailments to which they are subject, or to "prepare them for an easy confinement." All such prescribers are either knaves or fools, and should be shunned by such patients for their own safety. Pregnancy is not a disease *per se*, and, in the case of a healthy mother, neither requires nor admits of medication. Nor can it be doubted that many children are destroyed both before and after birth by the practice of drugging the mother, which so reprehensibly prevails among various classes of the community.

By the table it will be apparent that the mortality of infants under 1 year old, greatly exceeds that occurring between 1 and 5 years of age; while the mortality under 2 years is nearly four times

that between 2 and 5 years. Moreover, the number of children who die under 5 years of age, is greater than the whole mortality between 5 and 60 years of age! Hence the perils of life during the *five* years of infancy are greater than during the *fifty-five* years subsequent to that age. That this horrible fatality is a necessary evil, we should be slow to admit.

The *first year* of infancy, as we have seen, exhibits the most appalling waste of life, being one-fifth of the aggregate mortality of our whole city population of all ages and from all causes. The dangers to life attendant upon early infancy, and especially during the first year, are well understood by the profession and the public; these arise from a variety of causes, viz:—

1. Defective vitality at birth, hereditarily transmitted from one or both parents, whereby the infant is not viable, and perishes from inanition; nutrition and development being physically impossible. These are reported in the bills of interments as cases of marasmus, tabes mesenterica, consumption, &c.

2. Mismanagement of infancy, by parents, nurses, or doctors, in feeding and physicking the newly born; depriving them of the nutriment simultaneously flowing into the mother's breast, as nature's only and all-sufficient supply for nutrition and development, and substituting therefor the thousand slops, teas, and drugs which officious grannies, of both genders, are wont to prepare and administer. It may safely be computed that a moiety of the mortality among infants of days, is the direct result of spooning into the stomachs of new-born children some of the worst simples and compounds which they will ever taste through life, in case they survive the infliction. Not merely molasses, or sugar and water, catnip tea, olive or castor oil, goose-grease, spoon victuals, and the like, but salt and water, soot tea, gin sling, and even *urine*, are incontinently forced into the infant's throat before it has known an hour of life. Thousands thus perish in early infancy, their deaths being ascribed variously to colic, cholera, diarrhœa, dysentery, or convulsions, though oftener produced by drugging for the relief of symptoms which the mother's earliest milk would have prevented or cured; life being sacrificed by soothing syrup, Godfrey's cordial, Jayne's carminative, or some other vile mixture of molasses and water, with opium and brandy. These sleeping draughts and anodyne nostrums are more deadly poisons to budding life than all the diseases of infantile existence; and to these a very large proportion of in-

fant mortality is justly to be ascribed, for whole hecatombs of victims are thus poisoned out of life, in the very dawn of their being.

3. The ratio of infant mortality in large cities is conceded to be much greater than in country towns or rural districts, and for the reason that in the former so large a proportion of the births take place in the abodes of the indigent, which, if not in garrets or cellars, or shanties, are sadly deficient in the supply of light, pure air, free ventilation, cleanliness, clothing, fuel, and wholesome food, so necessary to the health, comfort, and safety of the mothers, not less than their offspring, whose vitality is henceforth to be derived from the maternal bosom in the milk, whose quality depends on the blood which circulates in her veins. Multitudes of infants born under these adverse circumstances of atmospheric contamination, perish in a few weeks or months for lack of pure air; and instead of marvelling at the extent and increase of fatality among such, we might rather wonder that any survive.

4. How much of the infant mortality in large cities, and its alarming increase, is the legitimate result of quackery in some one of its varied forms, to which sick children are subjected, may be difficult even to conjecture. That "false theories in medicine have slain more of our race than war, pestilence, and famine combined," has been affirmed by high authority. It is sustained by historic evidence. Nor have these medical heresies, the offspring of ignorance, presumption, superstition, and avarice ever been more rife, especially in large cities, than they have been of late years, and still continue. Every phase of quackery is characterized by an overweening faith in drugs, and a delusive confidence in specifics, inspired by the brazen effrontery of the charlatans who "by this craft have their gains," and who employ themselves in encouraging the people to become, with the aid of their new system of drugging, "every one his own doctor." Multitudes fall into this snare, and by the purchase of a box of specifics, and a book of instructions, are assured that they are possessed of the remedies adapted to all the diseases to which "our flesh is heir." The popular mind is indoctrinated by these quacks into the belief, that in all ordinary diseases they may confide in these specifics, especially for *infantile diseases*. And that thousands are annually added to our infant mortality by diseases entirely within the control of the healing art, the early periods of curability being lost, in these experiments of ignorance by credulous parents and pretended physicians, is notorious in every city. So true it is in this connection, that "for want of

timely aid, millions have died of medicable wounds;" nor is it less true, that by injudicious and misguided interference with drugs, by the ignorance of mothers, nurses, and doctors, our infant mortality is immeasurably augmented.

It remains, however, now to allude to the very considerable proportion of early mortality among the depraved and vicious families who abound in large cities, which results from the transmission of the hereditary poisons of either scrofulous, scorbutic, or syphilitic disease, from one or both parents to their offspring, whereby their young blood is fatally tainted with constitutional maladies, extending to the second, and even the third generation. The "parents have eaten sour grapes, and the children's teeth are set on edge." That multitudes of children thus perish early from diseases which descend from their parents, constituting a fatal inheritance of poisoned blood, is a fact as demonstrable as any other in human pathology. Hence it cannot be overlooked, in any inquiry after the sources of the extent and increase of infant mortality in large cities.

The extent, increase, and sources of infant mortality having been thus briefly considered, our next inquiry is into the means of its diminution, a task infinitely more difficult, and still more important. Is there any remedy for this deplorable and desolating scourge in our large cities? To this inquiry we now address ourselves, and in view of the sources of this waste of human life already enumerated, it must be obvious that a radical revolution in the public creed and practice, a thorough reform in the opinions, habits, and conditions of the masses of our city population, are indispensable to any diminution, either of the extent or increase of our infant mortality.

For obvious reasons, we begin our remedial means by alluding to the physical health and moral habits of the parents, which must be regarded as the primary root of the evil in a vast proportion of the cases. To increase and multiply the race was the original design of the Creator in ordaining marriage; and in negotiating every such alliance, both of the sexes should be impressed with the possibility and even probability of offspring. The physical health of both parties in every marriage contract should hence be regarded by each in anticipation of this result, and as equally important with the moral habits, on this account. And as marriage is a civil contract, the fruits of which vastly concern the public welfare, bearing as they do upon the present and the future generation, it is the duty of the State, in every civilized and Christian country,

to surround marriage with all the sanctions of law, and to protect the unborn fruits of such alliances from premature destruction by statutory enactments. These should be such as enlightened science and philanthropy suggest, and should be encouraged and enforced by the united power of religion and law.

1. No marriage should be permitted between parties, until the physical health of both has been subjected to professional scrutiny. And such alliances should be prohibited by law, to those of either sex, who are the subjects of those diseases which are known to be hereditary or transmissible to offspring, or such as are fatal to infantile existence. Celibacy should be required by statute of all consumptive, scrofulous, scorbutic, gouty, insane, intemperate, and especially syphilitic individuals of either sex, and this, for grave reasons of state, which concern the public weal. Nor will any course, short of such legal prohibition of marriage, adequately correct the evil of that large proportion of infant mortality thus engendered.

2. To remove the temptations to the unnatural crime of abortionism, and prevent the abandonment and cruel murder of unborn and newly-born infants, among the vicious and depraved portion of our population, for purposes of concealment, as in the case of the illegitimate offspring of shame, foundling hospitals should be provided by the State, in all our large cities, for the reception of infants, and the concealment of the shame of unhallowed mothers, and the protection and preservation of the infant innocents, who are doomed to abandonment by the guilty authors of their being. These charities, wisely conducted, would diminish the stillborn and premature birth interments, in all our large cities, by a moiety at least; while they would almost annihilate the plea of necessity, urged in behalf of the horrible trade of abortionism, and thus lessen the number of its victims. Lying-in asylums, for expectant mothers, irrespective of character, whether married or unmarried, in which such might conceal their shame, and then "go and sin no more," are equally called for, to prevent the double suicide, so often resorted to, by such; while diminishing the extent and increase of infant mortality, the foundling hospitals being made open to them all.

3. The "poor we always have with us," by a sacred legacy from the common Father of us all, and hence, the duty and responsibility of caring for such is recognized in every Christian community. But we have seen that among the suffering poor in our large cities, a fearful ratio of our infant mortality is found; and chiefly among

the thousands of families, unreached by any of our public charities. The habitations of the poorer classes of our population, are for the most part in narrow, contracted alleys, filthy courts, or underground cellars; or, at best, in what are called tenant-houses, in the miserable apartments of which, thousands of families, each cook, eat, and sleep in a single room, without the light, ventilation, or cleanliness essential to the life of either parents or children. Under such adverse circumstances, often destitute of wholesome food, comfortable clothing, or necessary fuel, the children of such families sicken, pine away, and die, prematurely, to an extent wholly unappreciated by the public, and unrelieved by the philanthropy of either the church or the State. Nor will this increasing source of our infant mortality be arrested, until the civil authorities shall, by public law, require the erection of dwellings for the poor, in accordance with the laws of health and life; and until, in all our cities, there shall be a sanitary medical police, whose duty it shall be to enforce such laws. No medical treatment can, by possibility, arrest diseases, or diminish their fatality, while the victims are found in the squalid and filthy abodes of the indigent, from which pure air, and often the light of heaven, are excluded, as among the wretched multitudes of our "cellar population," who furnish annually so large a share of our infant mortality.

4. The erection and endowment of hospitals for sick children are an imperative want in all our large cities, demanded alike by philanthropy and the public welfare, for the children of the poor, who thus only can be removed from the fatal atmosphere of their homes, by which their diseases are engendered, and within which their recovery is impossible. And as each of such habitations of the poor becomes, for lack of air, ventilation, and cleanliness, a centre of disease among its inmates, so, also, is it a nucleus, whence its atmospheric poison radiates through the neighborhood, infecting, by a physical necessity, the whole vicinity. It is thus that endemics become epidemics, and a filthy tenant-house is the source of pestilence, infecting the section in which it is located, and often sweeping over a wide space, or including a city in its ravages. Hence, if the public authorities be indifferent to the claims of humanity, let them be moved by their fears; and let children's hospitals be founded, for the reception of the squalid offspring of the indigent, as a measure demanded by considerations of the public economy and public safety.

5. Infant mortality, in large cities, in a great multitude of ex-

amples, which no man can number, is caused by the impure and adulterated milk, and other unwholesome articles of food, which are among the necessaries of life. Our profession has ever and anon sought to arouse public attention to this important subject, but in vain. Distilleries in or near large cities would be an intolerable nuisance and curse, apart from the mischiefs of their manufacture of alcoholic drinks, in view of the single fact, that, wherever they exist, their slops will furnish the cheapest food for cows, the milk from which is more pernicious and fatal to infant health and life than alcohol itself to adults; poisoning the very fountains of life. So long as distilleries are tolerated in cities, cow stables will be their appendages, and the milk, fraught with sickness and death, will still perpetuate mortality, especially among the children of the poor. All the artificial adulterations of milk, as by water or chalk, &c., are harmless, nay laudable, compared with the poisonous supply obtained from cows fed on distillery slops, for to this poison chemistry itself affords no antidote, since it defies all analysis or synthesis, a poison sui generis, utterly destructive both of health and life.

The evils we have deprecated from the bad quality of the milk used for the chief sustenance of infants are greatly enhanced, by the refusal or inability of so many mothers, among the rich as well as the poor, to nurse their children in conformity to nature's laws. Apart from the moral reasons which have been urged for this wise provision, that every healthy mother should furnish from her own bosom the sole nutriment for her offspring, there are equally forcible reasons of a physical character. All history and all experience prove that the attempt to rear infants by hand, even when the most urgent necessity may demand it, is always hazardous, and generally fatal, and this even before dentition has commenced. And those mothers who, at the dictate of fashion or ease, withhold themselves from the office and duty of suckling their own children, while their own breasts yield nutriment, and their health is adequate to the task, inflict upon themselves very great injury, while contributing to swell the aggregate of infant mortality. And, if such be the fact, whatever be the substitute for their own milk, and however satisfactory be the qualifications of the wet-nurse provided; how immeasurably is this evil increased, in view of the adulterated or poisonous milk with which so many mothers supply their offspring, at the tender period when nutrition and development imperatively require the supply which the maternal bosom can alone afford. The feebleness and atrophy, so often fatal to infants, are too frequently

the result of the privation, and nothing but dire necessity should ever remove any child for nutriment, to any other fountain than that which nature opens for its supply, simultaneously with its birth.

Finally, let it not be supposed that the extent and increase of infant mortality we deplore is exclusively among the children of the poor. The contrary must be familiar to us all, and statistics could readily be cited which would render it apparent that in the better circumstanced, and even among the wealthier classes of our cities, the instances are rare in which the most favored families succeed in preserving a moiety of their children through the perils of infancy. How much of the mortality in such is to be ascribed to the luxuriant and effeminate modes of life into which mothers, or those about to become mothers, are betrayed by the fashionable follies of the times, it might be difficult to compute, and as difficult to overestimate. And that much, very much, of serious and even fatal infantile disease is the direct result of the indiscretions of nursing mothers whereby the quality and quantity of their milk are deteriorated, and the health of their children overthrown, professional testimony might be cited in abundance. Errors in diet; late hours; crowded assemblies; the excitements of the opera, the theatre, or the ball-room; the transitions from high to low temperature; the exposure to night air, especially with insufficient clothing, such as exacting customs and fashion demand; are all incompatible with the duties of maternity, especially during pregnancy and lactation. The privation of all these by young mothers was voluntarily submitted to in the generation of our parents, and hence more children were reared to bless their households, and the pleasing spectacle of a "houseful of children" was not then so rare as it confessedly is now. Half a score of sons and daughters in a single family, all raised to adult life, and often surviving their parents, was so frequent an occurrence that the loss of children by healthy parents was the exception and not the rule. That it is otherwise now, does not admit of question, and for some of the reasons we have suggested.

It now only remains, in view of the extent and increase of infant mortality in large cities which we have shown to exist, that our profession and the public should be fully impressed with the facts, which observation and experience will fully corroborate, that such mortality need not and ought not any longer to be perpetuated. And if, as we respectfully submit, the sources and causes whence

the appalling fatality in infancy and childhood have been demonstrated to flow, be such as are removable by the instrumentality of public and private hygiene, and the general introduction of sanitary reforms into the popular creed and practice, then we may legitimately urge the means and measures suggested for its diminution as eminently worthy of consideration and regard. When we of the medical profession shall have fully enlightened the public mind upon the importance of the subject, and set forth the value of prevention by removing its causes, and the means adequate to the diminution of the evil, then, and not till then, shall we have done our whole duty in relation to the infant mortality, now so revolting and so frightfully increasing, in our large cities. The public press should be enlisted with its almost omnipotent voice, and the pulpit itself should put forth its energies in behalf of sanitary reform. The laws of health and life are of equal divine authority, and their wilful violation as sinful and as certain of retribution, as are the laws of the Mosaic code or the golden rule itself. In the behalf of the myriads of "infants not a span long," and who are perishing in our midst before they "know their right hands from their left," and whose young life is wasted for lack of systematic and united efforts to avert this sad catastrophe, we plead for inquiry, exertion, and public reform, in the hope of wiping out this foul blot from the escutcheon of our own country and the world.

Table of Mortality in the City of New York, for the 50 *years between* 1804 *and* 1853 *inclusive. Classified according to age.*

Stillborn and premature births	24,164
Of one year and under	78,762
Between 1 and 2 years	40,281
" 2 " 5 "	32,896
" 5 " 10 "	14,351
" 10 " 20 "	14,820
" 20 " 30 "	41,740
" 30 " 40 "	41,351
" 40 " 50 "	29,114
" 50 " 60 "	17,948
" 60 " 70 "	12,879
" 70 " 80 "	8,278
" 80 " 90 "	3,769
" 90 " 100 "	813
Of 100 and upwards	105
Ages unknown	1,971
Total	363,242

Infant Mortality for the years 1854, 1855, *and* 1856.

In 1854.	Stillborn and premature births	2050	
	Under 1 year	7116	
	Between 1 and 2 years	3697	
	" 2 " 5 "	2810	
	Total under 5 years		15,673
	" above 5 "		12,895
	Total mortality		28,568
In 1855.	Stillborn and premature births	1938	
	Under 1 year	6399	
	Between 1 and 2 years	3144	
	" 2 " 5 "	2582	
	Total under 5 years		14,063
	" above 5 "		8,979
	Total mortality		23,042
In 1856.	Stillborn and premature births	1943	
	Under 1 year	6050	
	Between 1 and 2 years	2937	
	" 2 " 5 "	2443	
	Total under 5 years		13,373
	" above 5 "		8,285
	Total mortality		21,658
In the 3 years, '54, '55, and '56—			
	Total under 5 years		43,109
	" above 5 "		30,159
	Total mortality		73,268

Total number of deaths reported for 1856		21,658
Of which there were children under 5 years		13,373
Viz.: Under 1 year	7993*	
From 1 to 2 years	2937	
" 2 to 5 "	2443	
Total	13,373	

Under 5 years 13,373—being nearly $\frac{5}{8}$ of the total No. of deaths.
" 2 " 10,930—being over $\frac{1}{2}$ " "
" 1 year 7,993—being nearly $\frac{3}{8}$ " "

City Inspector's Department,
New York, April 28, 1857.

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* Includes stillborn 1556
and premature births 387
Total . . . 1943

Leaving for disease and external causes under 1 year 6050—being nearly $\frac{7}{8}$ of the whole number.

REPORT

ON THE

MEDICO-LEGAL DUTIES OF CORONERS.

BY

ALEXANDER J. SEMMES, M. D.

"At sessions ther was he lord and sire,
Ful often time he was knight of the shire
A shereve hadde he ben, and a coronour,
Was no wher swiche a worthy vavasour."

CHAUCER'S *Frankelein*.

REPORT ON THE MEDICO-LEGAL DUTIES OF CORONERS.

THE office of Coroner is one of the most important and ancient known to the common law; its duties involve questions of the greatest interest to society, to government, and to the rights and privileges of the individual citizen.

The office is first mentioned in a charter granted in the year 925, by King Athelstan, to the authorities of Beverley. The name, indicating the relationship of the office to the sovereign authority of the realm, being derived from *Corona*, because its duties exacted a special attention to the pleas of the crown, or cases wherein the immediate prerogatives and interests of the sovereign were involved. In England, the Lord Chief Justice of the Queen's Bench is considered, *ex-officio*, the chief Coroner of the kingdom, and is endowed with the power of exercising the functions and jurisdiction of the office in any portion of the realm, not being restricted as the deputy coroners are to their counties and districts. When the wardenship of the counties was relinquished by the earls, the coroner became a peace officer of equal rank with the sheriff. *Mirror*, c. i. 3. As above mentioned, the office dates back to a remote antiquity; the *Mirror* says it was instituted by one of the Saxon monarchs (*Mirror*, c. i. s. 3); but the office, as at present constituted, was not clearly established until after the Norman conquest. In the Capitula of Henry II., and in those in the reign of Richard I., the justices were enjoined to select "three knights and one clerk in each county," who were styled *Custodes placitorum coronæ*, keepers of the pleas of the crown. *History of English Law*, by George Crabbe, c. xi., 1831.

In later times, the character and importance of the office have been much diminished, making striking contrast with the high estimation it was held in by our ancestors, in days when none but

the gentry and knights of the shire were deemed eligible. A statute of *Westminster*, 3 *Edward I.*, c. 10, enacted, that none but "lawful and discreet knights" should be chosen; and as an illustration of the requirements of the times, an instance is mentioned in the 5 *Edward III.*, of a man being removed from the office, because he was not a knight of the shire, but only a merchant or tradesman. 2 *Instit.* 32.

By the statute *De Militibus*, 1 *Edward II.*, a qualification was required of land, to the amount £20 per annum, to enable him to secure his elevation to the order of knighthood, which was then a prerequisite for the office—the theory being, that the coroner should possess lands enough to maintain, not only the dignity of his office, but to be held responsible for any fines and forfeitures that might be levied on him for any official malfeasance or misconduct. The common law of England being of force in the United States, the leading and important duties of coroners are similar in the two countries, viz: to make due and diligent inquiry into the cause of death, where there is reason to believe foul and criminal means have been used, or where a dead body has been discovered under suspicious or mysterious circumstances.

The authority of a coroner is necessarily judicial in its character; though he can make no inquisition of any felony, save that of a violent death, under suspicious circumstances, and, then always on view of the body, *Super visum corporis.* 4 *Instit.* 271 and 2 *Hale* 65.

Previous to the publication of the Magna Charta, Coroners not only received accusations against offenders, but they also proceeded to try them.

The present defined powers of coroners, in Great Britain and the United States, unless modified by British statutes and American acts, are derived from the English *Stat. de Officio Coronatoris*, 4 *Edward I.*, s. 2. It provides, that where a death takes place suddenly, under suspicious circumstances, the coroner shall, by his warrant, summon a jury to make due inquiry, upon view of body, into the manner of the killing; who were present; and to examine the body; and that he may likewise commit any person to prison who may be adjudged as the author of the crime, and bind over the witnesses by recognizances to appear at the next term of the court.

It is not necessary that the inquisition should be held in the place where the body was found, or viewed, 2 *Hawkins, Pleas of the*

Crown, c. 9, ¶ 28, but if the inquisition of death be held without the view, the whole proceedings are held to be void.

From the above condensed statement of the history and legal obligations of coroners, we see that deep interests are involved in the proper discharge of their duties. The character, liberty, and perhaps the life of a citizen accused of crime, on the one hand, and on the other, the aiding of public justice, in establishing the guilt and securing the punishment of the actual criminal. For the faithful execution of the duties of the office, it demands, on the part of those to whom it is intrusted, qualifications of a high character. In addition to an intimate acquaintance with what are ordinarily termed the Institutes of Medicine and Surgery, they must also have a practical knowledge of toxicology in all its details, habits of close and cautious observation and analysis, and a familiarity with the elementary laws of evidence, and with the principles of medical logic.

Many of the questions which fall within the scope of a coroner's inquisition, are of an intricate and most perplexing character, a correct solution of which can only be arrived at by minds the best instructed, and habituated to their investigation. A human body is found in the river, or suspended by the neck. In such a case, several facts are to be established by the inquest: whether the extinction of life is due, in the one instance, to asphyxia from drowning, and, in the other, to asphyxia from strangulation, or whether death had not been produced by other means, and the body then cast into the water, or suspended by the neck, for the purpose of concealing the actual mode of the death. Should the cause of the death be traced to drowning or strangulation, then arises another question: whether the immersion or suspension of the body was suicidal, accidental, or the work of wicked and felonious hands.

Even centuries ago, so important were the facts considered to be, which a skilfully conducted inquest could elicit, that the statute 4 *Edward I.* required, in the most explicit terms, "that it is to be inquired of them that be drowned, or suddenly dead, and after such bodies are to be seen, whether they were so drowned or slain, or strangulated by the sign of a cord tied straight about their necks."

"Also, all wounds ought to be viewed, the length, breadth, and deepness, and with what weapons, and in what part of the body the wound or hurt is." This old English statute requires, in

the most explicit terms, the kind of examination which only the skill of a medical expert could accomplish.

In many cases some of these questions can be satisfactorily settled by the evidence of persons having cognizance, more or less direct, of the facts: in others, however, they only can be solved by the facts deduced from pathological anatomy, and other circumstances connected with the dead body, the cause of the extinction of life in which is the subject of the inquest.

Are the persons usually selected to fill the office of coroner, or those whom, in accordance with law, they call to their aid in the capacity of jurors, qualified for the faithful and satisfactory management of such an inquest?

Are they those, generally, who, from education, pursuits in life, and their daily associations, are the best prepared to solve even the least intricate of the medico-legal questions involved in the inquest they are solemnly sworn justly and truly to make? An inquest upon which so much depends—the finding of which will, perchance, form the basis for the arrest, indictment and trial of a human being for the most heinous crime known to the law—wilful, premeditated murder, the penalty of which is an ignominious death upon the scaffold.

In the course of time, abuses creeping into the system, and from neglect, this important office has been permitted to fall into disrespect, and into low, ignorant, or incompetent hands.

We have strong evidence of the care and caution with which these officers were selected in olden days, when it was enacted by statute *Westminster* 1, 3 *Edward I.*, c. 10, "Forasmuch as mean persons and indiscreet now of late are commonly chosen to the office of coroners, when it is requisite that persons *honest*, *loyal* and *wise*, shall occupy such offices; it is provided, that through all shires sufficient men shall be chosen to be coroners, of the most loyal and *wise* knights, which know, will and may best attend upon such offices, and lawfully shall attach and present pleas of the crown."—*Hawkins*, *P. C.*, vol. iii. c. 9, p. 101. London, 1795.

Do the laws require, or does public opinion demand, that the coroner should be a regular, well educated and otherwise well qualified medical man, or, at the least, a person well instructed in the duties of his office?

In some of the States of our Republic, there is some legal provision confining the appointment to medical men; but generally, any citizen, whom the dominant political party of the day may, in

its wisdom or caprice, think proper to elect to the office, is forthwith invested with all the duties, powers, and time-honored prerogatives of coroner. Whatever may be his character or fitness, to him are intrusted the primary steps in the investigation of every case of alleged or presumed homicide that may occur within the county, and upon the finding of his inquest, a citizen may be arrested and placed under duress, until such time as a court shall determine his guilt or innocence.

There is legal provision, it is true, that the coroner shall summon to his aid, in the prosecution of his inquest, a certain number of good and lawful men, and that upon their verdict shall be based the finding of the inquisition.

In the composition of the coroner's jury, is care generally observed to select it from among the discreet and intelligent classes of the community? Is it not usually formed by summoning any passer-by—any one, in fact, who may chance to be in the neighborhood where the inquest is held—probably the idler, or the ignorant laborer? or, as it has been the case where the compensation of jurors is liberal, under the administrations of certain coroners, when those officers provide themselves with a permanent and ambulant jury, are its members competent to the solemn and momentous duties devolved upon them by the laws of their country?

Your Committee fear that the only response that can, in truth and candor, be given to these questions, must invariably be in the negative.

As every inquest involves a medical principle, your Committee are pained to acknowledge that, from the shameless and disgraceful manner in which coroners' inquests in most of the United States are necessarily conducted, from the incompetency or want of zeal and attention of that officer, these inquests are rendered loose, vague, hurried, and ill-adapted to the purposes for which they are intended at common law—the discovery of the cause of death in cases of presumed or alleged felonious killing—the identification of the body, and the collection of that evidence which can often only be susceptible of verification immediately after the discovery of the corpse, and before any change has been made in it and in the condition of the surrounding objects.

The superficial view cast by the jurors upon the dead body presented for their inspection—many of them avoiding to approach it closely, either from repugnance to the sight or contact of the dead, especially when mutilated or disfigured by wounds, bathed in blood,

or in a state of partial decomposition, or from fear of contracting some contagious or pestilential disease which might possibly have been the cause of death—is scarcely a formal compliance with the requirements of the law.

Your Committee believe it is usual, though not always, for a post-mortem examination to be made for the instruction of the coroner and jury, by some medical man, and, where there is a suspicion of poisoning, for the contents of the stomach to be submitted, for analysis, to the chemist. Occasionally this autopsy and analysis are conducted by persons in all respects fully competent; but too often they are given to unskilful and inexperienced hands, unable or unwilling to perform them properly, or to derive from the facts of the case any positive and reliable conclusion.

When the individual whose death is supposed to have been the result of wilful violence or of any felonious practice, leaves behind him relatives or friends able and willing to bring to condign punishment those who shall be ascertained to have been instrumental in destroying his life, the medico-legal investigation is generally fully and properly executed; but when it is left entirely to the coroner, he must be content to procure whoever may be willing to undertake the examination for the very inadequate compensation allowed by law—when any provision is made for the payment of such services—the physician being expected, in the District of Columbia and in some of the States, to perform all medico-legal investigations gratuitously. Occasionally, it is true, the mere love of science and the pursuit of knowledge will induce the skilful anatomist or the competent chemist to volunteer his services.

A medico-legal examination is a subject of too much importance to allow that its performance be left to the zeal of friendship, the judgment of the coroner, or the possible enlistment of some devotee of science. Its faithful performance should be invariably secured by legal provisions, and a certain and adequate compensation assigned, in order that the aid it is capable of yielding to the cause of public justice may be available in the case of the humblest and poorest as of the most distinguished and wealthy citizen. For the constitution and laws of these United States, under which we have the privilege to live, establish the perfect liberty, equality and fraternity of us all.

There are many cases in which the results of a properly conducted medico-legal investigation can *alone* lead to a correct conclusion as to the cause of death, to a confirmation of moral testimony,

and enable a court and petit jury to determine the guilt or innocence of the individual indicted for murder. There is no case in which it will not lend important aid in protecting the character, liberties, and lives of our citizens, and in rendering criminal law more clear, prompt, and certain in the detection and punishment of crime.

As coroners' inquests are now constituted, the findings are based solely upon the testimony of whatever witnesses are presented for examination—which evidence is frequently of the loosest and most irrelevant character—the statements of the physician—if there happen to be one—who attended the person whose death is the subject of inquest, previous to his decease, and the testimony of whoever made the post-mortem examination subsequently. The medical evidence being seldom, if ever, properly compared and tested with that derived from other sources. It is not surprising, therefore, to your Committee, that the verdicts of such hasty and unreliable inquests should be so frequently dismissed by grand juries, or essentially modified, if not entirely rejected, by the decisions of the courts before whom the cases are finally tried.

Among other abuses, there is no feature more objectionable, to which the Committee would direct the attention of the Association, than the publicity and indecent haste with which the proceedings before coroners' inquests are usually conducted. A death takes place under circumstances of profound mystery, or such as arouse strong presumption that a foul and horrid murder has been perpetrated, as unhappily illustrated in the recent Burdell tragedy in the city of New York. The public mind, through the instrumentality of the press, is wrought up to a state of frantic excitement. The busy tongue of rumor, prompted by imagination, spreads abroad statements, probable and improbable, having not the slightest foundation in truth. Innocent parties are either boldly accused or suspected of the murderous deed by the popular voice, as though they had already been convicted by the most conclusive evidence. Amid this excitement the coroner's jury assembles at the scene of the "bloody tragedy," and proceeds to make "due and diligent inquiry" into the cause of the death that has occurred, and which, perhaps, is clothed with the profoundest mystery. Can the coroner discharge the duties of his office with truth and impartiality, uninfluenced by the various reports retailed, magnified and commented on by an excited, clamorous, and probably indignant populace? Every step during the investigation is narrowly watched, and the entire pro-

ceedings of the jury are open to all who may be directed by idle curiosity to attend them, and become, in their turn, the subject of criticism and exaggeration to the neighborhood, if not to the entire community. To the guilty party there are often revealed circumstances indicating the strength of the suspicions as to his agency in the murder that has been perpetrated, and the completeness or deficiency of the chain of circumstantial evidence by which the crime may be fastened upon him, to enable him to mislead legal inquiry, or, at least, to elude the grasp of justice; while, on the other hand, the testimony adduced before the inquest is either so irrelevant, that, if not ruled out, it is so often distorted by prejudice and shaded by the rumors prevalent among the populace, and so seldom sifted and tested by a judicious cross-examination, as to be seized upon by idle, inconsiderate, or malicious tongues to cast suspicion upon some one who has not had the slightest agency in causing the death under investigation, rendering it difficult, it may be, for him to prove his entire innocence, and, in consequence, leaving a slight stain upon his reputation forever afterwards.

It may be urged that, inasmuch as the inquest is only preliminary, and its verdict is not final, any error that may be committed in the proceedings, leading to a mistake in the finding, can be productive of no permanent injury, an opportunity being afforded to correct the one and rectify the other when the case is called for trial before a court and petit jury. If there were any weight in this remark, it would be equivalent to an admission that the action of the coroner and his jury is, in all cases, worse than useless. It is not true, however, that when the inquest of the coroner is conducted in so imperfect and careless a manner as to lead to a return not borne out by the true facts of the case, no mischief is produced. No mischief! Harm, serious and grievous harm, is too often done. It is evident that serious detriment must invariably result to society, and a very great impediment be presented to the free course of justice, so long as the slightest doubt exists as to a correct finding, in any case, of the preliminary medico-legal investigation.

The object of the coroner's inquest is, to determine, with as much certainty as the nature of the case and the present state of our knowledge will permit, the cause by which life has been extinguished in every instance in which a judicial inquiry is demanded by the laws of the State. It is all-important that this preliminary inquest be fully and satisfactorily accomplished, and its result be presented to the court and jury that are finally to pass upon the

guilt or innocence of the parties who stand accused of homicide, in a form that will neither admit of doubt nor of cavil.

Your Committee believe, however, that this can scarcely be anticipated so long as the office of coroner is constituted and conducted as it now is throughout the United States.

The important functions of the office, however, cannot with safety be dispensed with; they must be performed by some one; and hence comes up the important question, the consideration of which has been intrusted to the present committee, in pursuance of a resolution adopted at the Philadelphia meeting of the National Medical Association, namely, "What measures should be adopted to remedy the evils existing in the present methods of holding coroners' inquests?"

The first measure, it is evident, will be to provide by law for the proper qualifications of the officer upon whom the medico-legal duties now intrusted to the coroner's office are conferred, for their correct and faithful performance.

In all the cases in which an inquest is required to be held by the coroner, three questions present themselves: 1. What was the cause of death? 2. Was it the result of criminal agency? And, should this second question be answered in the affirmative, 3. By whom was the criminal act perpetrated?

The solution of the first of these questions should, in our opinion, be submitted to a special commission composed entirely of experts, and the proper investigation of the other left to the jury; and whatever may occur in the course of the inquiry instituted by the special experts, in the least calculated to throw light upon the second or third questions, can be readily communicated to the jurors, for their instruction.

Your Committee would suggest that the office of coroner, as now established by law, be reorganized entirely upon a new basis; and that the person appointed to the office should be in all cases a competent and respectable doctor in medicine, to be selected by the judges of the criminal courts, and that while the tenure of his office should be during good behavior, the incumbent to be liable to impeachment before the court for misdemeanors and derelictions of official duty. To said coroner immediate notice shall be given of every case of death in which an inquest into the cause by which life has been extinguished is demanded, by the magistrates, police, county constables, and bailiffs, to whose knowledge the occurrence of such death shall first come; and when any death, whether natu-

ral or violent, occurs in any jail, workhouse, penitentiary, or any other place for penal confinement, the notice of such death should in like manner be communicated by the wardens, governors, or superintendents of such institutions. Upon the receipt of which notice, the coroner shall call to his aid two other doctors in medicine, and, in conjunction with them, shall proceed forthwith to make the required inquisition in the fullest and most thorough manner; power being conferred upon him to take charge of the dead body, to summon and attach witnesses, and to take whatever steps he may deem necessary for the lawful and constitutional performance of his duties.

The entire proceedings of the medico-legal examination shall, at the discretion of the coroner, be strictly private; and in case of the refusal of any parties to comply with his injunction against publication, he should be clothed with the power of holding and punishing the contumacious offenders, as having committed a judicial contempt.

The examination in each case being completed, a full and detailed statement of it shall be drawn up, with the conclusions arrived at in regard to the cause of death clearly set forth; which statement, signed and sworn to by the medical experts by whom the examination was conducted, shall be delivered to the ordinary jury of twelve "good and lawful men," for their instruction. After the examination of other material evidence, and when the jury shall have returned their verdict, with the statement indorsed and sealed by the coroner, it shall by him be filed in the office of the prosecuting attorney for the district or county. The important point your Committee have in view is to secure the proper person to discharge the duties of the office; and this, we believe, can rarely—in fact, never—be done unless the selection be confined to regular, well-educated, and respectable graduates in medicine.

It may be necessary, in the large cities and populous counties, to appoint two or more coroners; different districts, with concurrent jurisdiction, being assigned to each.

Your Committee have already suggested that the coroner should be appointed by the judge of the criminal court of each county, or by any other court of law exercising original jurisdiction over criminal offences. This method of filling the office will be more successful in securing the selection of one having the special attainments demanded for the faithful and intelligent performance of its duties than that by popular election. Amid the strife and excite-

ment of politics and the predilections of party, those special attainments cannot be expected to be regarded with sufficient care, and the vote of the people will be as likely given to one candidate distinguished only for his fealty to party ties and usages, as to another eminent for his peculiar capacity and scientific acquirements. These considerations are independent of the tricks, bargainings, corruptions, and intrigues which are too often resorted to by professional politicians in our larger cities, in the wild hunt after that golden charm, the caucus nomination.

The proposition to conduct the preliminary medico-legal investigation in privacy at the discretion of the coroner, must command the assent of every reflecting mind. There is no difference, after all, in theory, between the examinations of the grand jury, whose proceedings are always conducted with closed doors, and those of the special inquisition of the coroner. The jurisdiction of the coroner does not extend to the trial of any party accused, but merely to an investigation into the cause of death, and whether that death was or was not feloniously produced. The grand jury have no power to try cases, but are assembled merely for the purpose of receiving accusations, making inquiries as to alleged violations of the laws, and to ascertain if there be sufficient evidence, and, if uncontradicted, to justify the finding of a true bill of indictment, and thus sending the party accused down to court for trial. Now, if the public interests demand that the proceedings of the grand jury be conducted in secrecy, there is no impropriety in recommending that the sessions of coroners' inquests should also be conducted with closed doors. The proposed privacy will abate the public excitement which always exists when a death demanding such an inquest occurs; it prevents misrepresentations in regard to the evidence, while it enables those to whom the examination is intrusted to perform their duties without interruption and with more caution and attention.

In regard to the proper compensation for the services of the coroner, the whole system of fees should be abolished, and he should receive, in lieu thereof, a certain specific annual remuneration, to be paid out of the treasury of the county or State. The two experts whom he calls to his aid should be entitled to a fee, either the same for each report made by them, or varying with the amount of time and labor which, in different cases, will be required of them.

The laws of all civilized countries in the Old World provide for the proper remuneration not only of coroners, but also of experts

and medical witnesses summoned to give purely professional opinions. Your Committee believe that, in many of the States in the Union, provision is made, inadequate it is true, for the payment of such claims.

In France, the judicial officers are required to subpœna medical men in the examination of the causes of all deaths occurring under suspicious or unknown circumstances. (*Code d'Instruction Criminelle*, Art. 44—281.) When the experts or medical witnesses are called upon by the law officers of the crown to make an examination, or give a professional opinion, they become entitled to certain fees, which are regulated by the character of the services rendered. *Hubert, Manuel des Lois*, 133. Paris, 1826.

In Bavaria, a liberal compensation for medico-legal opinions and examinations is provided by law. *Ordonnance Royale*, Mar. 31, 1826. The Austrian code authorizes the appointment of medical men, who are assigned to certain districts, and whose duty it is to superintend and draw up official reports of all medico-legal examinations and inquests in all cases of suspicious or mysterious deaths. In Vienna, the great and world renowned Rokitansky, who is the official pathologist, assists at the autopsies demanded by the judicial authorities.

The Russian laws authorize the appointment of similar officers with the same functions and jurisdiction.

In Ireland, statute 10 *George IV.*, c. 31, fees, not exceeding £5 sterling, are paid to medical witnesses on coroners' inquests. In England, an act was passed in 1836, authorizing one guinea for opinions, and two guineas for post-mortem examinations performed by medical men.

In Georgia, for each view of the body, where there is no dissection, the law allows the medical witness ten dollars as his remuneration; when dissection is requisite before the interment of the body, twenty dollars; and, if an examination of the body after burial is demanded, thus necessitating its disinterment, the sum allowed is not to exceed thirty dollars. There is also a fee of fifty dollars if a chemical analysis be required.

In most of the United States the laws authorize some small and insignificant compensation to the medical experts and witnesses. In the District of Columbia, under the present law, there is no legal provision for the payment of scientific services rendered on a coroner's inquest.

Now the law is inoperative without the professional action of a surgeon, physician, or chemist: it being necessary to make, as

shown, in one case, a careful anatomical investigation; in another, to explain the physiological and toxicological effects of drugs; and, in another, or conjointly with this, to test the contents of the alimentary tube, and, even of the blood and its eliminations. Unless legal provision be made by government for the pecuniary remuneration of the individuals to whom these important, and often most indispensable offices may be assigned, public justice is suspended, and the administration of the law, by the action of the courts, arrested; or these laborious professional duties performed for the use of the government gratuitously, which is an anomaly in our social and political system. No other class of citizens are expected to perform professional duties without compensation—nor will they perform them—and these individuals, by refusing their aid, as it is reasonable that they should, may thus render the action of the law void and inoperative.

Considering the great amount of beneficiary duties necessarily devolving on the medical man, it is still more important that some legal provision for the payment of his just claims should be made.

A physician is summoned to render aid to a person supposed to be poisoned or feloniously injured by the action of another party—he attends without reward, the patient being probably a pauper. The present illiberal system expects that he make the necessary inquiry after death by anatomical investigation or chemical analysis; and that he communicate in detail the result as a witness in court, giving, at the same time, an opinion based upon this investigation, which none but those learned in medical science are capable of doing (in the meantime neglecting his private affairs and his remunerative professional business), and there is no pecuniary provision made in his case except as a common witness—while all other agents of equal, and oftentimes of much less, importance to a correct understanding of the facts and a just judgment, are promptly and amply provided for.

The remedy naturally suggested to the profession by self-respect, is a declension, firm though respectful, to perform autopsies and make chemical analyses when requested, or illegally commanded, by the judicial authorities in those States of the Union where there is no provision for the remuneration of medical experts and witnesses. It is time, your Committee believe, for the members of our profession to assume a frank, bold and resolute position. There is no legal authority which can compel a medical man to open a dead body, or make a chemical examination of the contents of the ali-

mentary tube; and, should he be subpœnaed to attend an investigation, it is only admissible to testify as to facts within his own knowledge, and he can refuse respectfully and firmly to go further.

The members of the profession of medicine everywhere are, as a class, beneficent and self-sacrificing, laboring always cheerfully and gratuitously in the cause of humanity and in the service of the destitute. But they, too, must live while they thus labor, and it cannot be expected by government, they should serve the wealthy in their most professional position without the obligation being recognized and requited.

I cannot bring this report to a conclusion without acknowledging the important aid and counsel so cheerfully extended by Drs. D. Francis Condie, of Pennsylvania, and Grafton Tyler, of Georgetown, D.C., my colleagues on the Committee appointed at the Philadelphia meeting of the National Medical Association.

All of which is respectfully submitted.

A. J. SEMMES, M.D.,
Chairman of the Committee.

WASHINGTON, April 14, 1857.

REPORT

UPON THE

TOPOGRAPHY AND EPIDEMIC DISEASES

OF THE

STATE OF GEORGIA.

BY

JOHN F. POSEY, M.D.,

OF SAVANNAH.

REPORT UPON THE TOPOGRAPHY AND EPIDEMIC DISEASES OF THE STATE OF GEORGIA.

THE State of Georgia must, for purposes of medical topography, be divided into three unequal parts.

The largest, occupying more than half the area of the State, extends from the sea-coast and Florida line on the south to the head of navigation of the larger rivers.

The second division is separated from the first by a line beginning at Augusta, at the head of navigation in the Savannah River, and running nearly west-southwest, by Milledgeville and Macon, to Columbus, at the head of navigation in the Chattahoochee; and is bounded on the northwest by a line drawn from the northeastern corner of the State, and running nearly southwest till it reaches the western boundary line of the State, about half way between Columbus and Nicajack, on the Tennessee River.

The third occupies all the space, within the State, lying northwest of the last-mentioned line, and is much smaller than the second.

The first division is, geologically, of tertiary formation, varying in height and quality of alluvium according to the distance from the sea-coast.

Dr. P. M. Kollock describes the part nearest to the sea thus:—

"The topographical features of this district may be distinguished into three separate orders, marked by strips or sections extending lengthwise from northeast to southwest.

"Commencing with the Sea Islands on the east, we remark a series of sand-knolls or hillocks, apparently washed up by the sea from its bottom, varying in elevation, intersected by salt-marshes and creeks, and inclosing frequently brackish ponds and lagoons.

"The growth of these islands is live-oak, water-oak, bay, gum, and pine. The live-oak predominates on the southern parts of the islands, almost to the exclusion of the pine; while this last is found at the northern end.

"The soil is a grayish and yellowish-brown sand, mixed with shells and vegetable mould, without any mixture or substratum of clay. This soil, for the most part, is thin, extending only a few inches in depth.

"These islands are separated from the mainland by extensive salt-marshes, which are intersected by numerous creeks, and overflowed by every high tide.

"The islands are also separated from each other by sounds, or arms of the sea, which are the outlets of the rivers to the ocean.

"Leaving the islands, and crossing over to the main, we enter upon another section or strip of country, varying in its topographical features from the islands; a low pine-barren, intersected with the rivers and swamps before mentioned.

"The growth of these barrens is the short-leaved pine, mingled with scrub-oaks and gums. The soil is sandy, with here and there a sprinkling of red clay.

"In wet seasons, while the swamps are full of water, this pine-barren soil is kept in a sobbed state, the drainage being bad by reason of its flatness.

"Passing across this section, inland, twenty or thirty miles in width, we strike a somewhat more elevated and rolling region of sand-ridges and hills, intersected with bay-galls and branches, and sometimes ponds.

"The soil is sandy, with a substratum of clay at varying depths. The long-leaved pine takes the place of the short, and predominates, to the exclusion of almost every other tree."

The mainland adjoining the salt-marshes, which divide it from the Sea Islands between the Savannah and Altamaha Rivers, usually commences with a line of bluffs, which rise twenty or thirty feet above the level of high water, separated by arms of salt-marsh and small streams of fresh water, carrying the water springing from a line of sand-hills twenty or thirty miles further inland.

These streams have a tide flowing a distance of ten or fifteen miles above the bluffs, and for about the same distance further they are margined by a fresh-water marsh and swamp, from half a mile to a mile in width, with strips of higher land between them, which are of an older formation than the alluvium of the swamps, this last being yet in the process of deposit.

Some of these strips of higher ground are remarkable for the growth of plants not usually found growing so near the sea-coast.

Between the line of bluffs and the line of sand-hills the greatest

part of the rice which is grown in Georgia is produced, and also much of the long-stapled cotton.

The line of sand-hills is an abrupt rise, from a comparatively level plain, of about sixty feet, which height is very gradually increased as the distance from the beginning line is increased, with a succession of undulations of no great altitude, except near the river swamps. These swamps are like wide, shallow valleys cutting through the undulations, in which the streams meander from one side to the other, without any apparent cause for keeping any particular course.

These valleys are filled to their present surface-level with the most recent alluvium, the vegetable mould now forming on the spot, sometimes covered with water and a growth of cypress, and in other places dry, with a heavy growth of such trees and bushes as delight in a damp, rich soil.

Into these swamps and lowlands the above-mentioned undulations project more or less, producing an irregular line of river hills, having the valleys between them gradually rising from the level of the river swamps to that of the innumerable ponds that are scattered all over the face of this part of the country. These valleys, which carry off the surface water after rains, wind about among hills of but little height above them, until approaching the river swamps, where they seem to have been washed deeper, but are accompanied in their whole course by that kind of water-drain called by the inhabitants "bay-galls," which are from thirty to sixty yards or more in width; these are like the river swamps, on a smaller scale, and often resemble vast hedges dividing fields of open pine-barren, or dense thickets of low whortleberry-bushes, or species of Andromeda called by the people "tie-tie."

When these bay-galls, in their course to the river, meet together, they make considerable streams, which seldom run dry, and in some places have cut for themselves channels with fall sufficient to drain the swamps on their sides for some distance; these channels are commonly filled more or less thickly with silicious stones, often being casts of some bivalve.

What is here called "rotten limestone," probably underlies this whole region, and is found in digging wells, where they have to be sunk deeply; and, where this is the case, the water is commonly impregnated with what seems to be putrid animal matter, which renders it exceedingly disagreeable, and, in the general opinion, unhealthy.

At the distance of about one hundred and twenty miles from the sea, the rotten limestone ceases, and mica schist begins to be found in the beds of rivers and other deep excavations; here, also, the hills are higher and steeper, and oak and hickory are mixed with the pines; cypresses are no longer found, and the small watercourses have high, steep banks, without swamps; here, also, the long-leaved pines cease, and soon the primitive formation crops out.

South of the Altamaha River, after leaving the tide-way, the face of the country is described by Dr. Kollock thus:—

"The soil varies in its qualities and appearance, 'being either a dark-gray or a black mould, and is superficial, with an argillaceous substratum to the depth of five or six feet, and in a dry time becomes so hard that it is almost impervious to the plough or hoe, and cracks in every direction, forming extensive fissures of considerable depth.' In such localities it is rare to find good water. According to Dr. T. S. Hopkins, of Wayne County, white clothing, washed in this water for a time, will assume a yellowish hue, analogous to that which would be produced by a very weak solution of sulphate of iron.

"This section of country, says the same gentleman, is known as the 'lowlands,' and is invariably abandoned by the planters in the early part of June.

"In a very dry or very wet season, the negroes on the plantations seem to enjoy almost an entire immunity from the severe grades of bilious remittent and congestive fevers which are common at other seasons.

"Immediately above the lowlands, in Glynn County and the great Buffalo Swamp, the land rises at least eighteen feet, the soil is sandy and poor, the growth chiefly pine and blackjack, intersected occasionally by spring branches, which afford at almost all seasons of the year an abundant supply of fine water. The well-water throughout this section cannot be surpassed in purity and coolness even by our mountain springs."

On the south, in Ware County, is the great Okefonokee Swamp, of which it is not necessary to say more than that it is but little known as yet; but a survey, by order of the legislature of the State, is now in progress.

On the west, and further inland, "the face of the country," says Dr. H. Briggs, of Troupville, "is level, rolling somewhat in the southern half, interspersed throughout with shallow ponds and bays, some of which are timbered, others destitute of trees; filled to over-

flowing with water during the rainy seasons of winter and spring, but usually nearly or quite dry during the latter part of summer and autumn.

"There are some ponds of a different kind in the southern part. They appear to have been formed by portions of land settling down, and the water rising to a considerable height above the depressed portions.

"These were formed a long time since, as the banks are now very evenly sloped, and covered with trees of mature growth. They do not all appear to be of the same date. They are usually round or elliptical, varying in depth from three to fifteen or twenty feet, not very sensibly affected by rain or drought.

"There are in almost all sections some evidences of lime underneath the clay, such as lime-sinks and sundry subterranean passages, into which the creeks pour a part of their waters; also some lime-water springs.

"The country lies upon the Mexican Gulf slope, the declivity being from fifteen to eighteen inches to the mile. The watercourses have a general southern course, and are all tributaries of the Suwanne or Ocklockonnee Rivers. The creeks and branches spread far and wide after a rainy season; and after a long dry summer they are either dry, or nearly destitute of running water. The largest are mere drains for the surface water.

"The soil is a sandy loam, underlaid with clay at various depths, from six inches to several feet.

"The well water is soft and generally free from lime, except after protracted drought.

"The country is generally covered with pine forests, and the wild grasses and flowering plants indigenous to all this region.

"There are some isolated portions of country covered with a heavy growth of oak, hickory, magnolia, &c. The bays and margins of the creeks and branches are wooded with cypress, bay, gum, water-oak, live-oak, and a dense undergrowth of evergreen shrubs.

"The pine lands are moderately productive, yielding corn, cotton, potatoes, rice, sugar-cane, wheat, and oats.

"The hammock lands are more productive, but probably not more durable. Very little has been done, as yet, in the way of reclaiming bay or swamp lands.

"Oyster and other marine shells abound in the beds of all the larger streams; they have undergone silicious petrifaction.

"In the southern part, along the banks of the streams, specimens of chalcedony, large masses of yellow limestone, and orbitulite are frequent.

"About midway between the Atlantic and Gulf coasts, the temperature in summer, during the day, is often as high as ninety or an hundred degrees; I have not known it to exceed one hundred and two degrees at any time. The nights are seldom oppressively warm after nine P. M. The gales that so frequently prove disastrous upon the Atlantic coast, are scarcely observed here. Those of the Gulf coast are sometimes severely felt, particularly in the western part of the district."

The second division of the State begins on a line running from Augusta by Milledgeville and Macon, to Columbus, being the head of navigation in the principal rivers of the State, and differs entirely from the first in geological formation, being primitive; and the face of the country, which is more hilly, and the streams being mostly confined between high banks, and without any marginal swamps, with rocky beds, over which the current is generally very rapid.

The hills, near the larger watercourses, are commonly very steep, often with large masses of coarse-grained granite piled up like houses, and rapidly disintegrating, from the effects of the weather. These hills are composed of clay of various colors, red predominating on the higher parts, while in the deep cuts made by the streams, a white, extremely tough plastic clay is found, mixed with a very fine white sand, with white flint stones, often in oblique cubes, with unpolished surfaces.

In some places dikes of silex, or of coarse mica, cut into the hills like veins of a mine, as if immense masses of granite had been decomposed into clay, leaving veins of silex or mica in place.

The red clay always contains grains of silex, and sometimes mica in very considerable quantities. Transparent crystals of quartz abound, sometimes single, but mostly covering a mass of agate, or lining a cavity in the same. Small masses of felspar are found on the surface, and geodes, an inch or less in diameter, containing a quantity of red ochre.

There are places in the central parts of this division, where the granite lies bare, like an old field of some acres, having banks round it like those of a tranquil watercourse, green with mosses and constantly damp.

The soil is a light gray, and strong, and very productive while

new, but very quickly destroyed by careless cultivation, such as has been practised ever since the first settlement of the country, leaving bare the clay, upon which scarcely any vegetable can grow.

The most productive lands, and those which are longest in being exhausted by the slovenly cultivation aforesaid, are those called here "river low grounds," where the surface to a varying depth, sometimes more than ten feet, is composed of vegetable matter intimately mixed with the washings from the hills. This land is always highest immediately at the edge of the stream, and gradually becomes lower, until it reaches the foot of the hills, where there is often standing water.

A large proportion of the cultivated land in this part of the State, is in what is called "the Flat-woods," being table land on a small scale, at a distance from the larger streams, having a stiff clayey soil, not very pervious to water, and, therefore, in a wet season liable to be soaked, and sometimes overflowed, the watershed not always being very obvious.

The forest growth is oaks of several species, hickory, chestnut, black walnut, pine, beech, maple, dogwood, buttonwood, here called sycamore, crab-apple, &c., in the order of frequency here indicated.

The northern part of this division contains most of the rich mines of gold, copper, &c., with mineral springs in various places; but the springs and wells in general furnish very pure "freestone" water.

The temperature varies much in the different parts of this division; along the southern boundary line the summer days, in dry weather, are oppressively hot, with little wind, while the nights are cool and pleasant. Thunder squalls are frequent, stirring up the atmosphere, bringing down the cold air from above, while the rain washes the dust from the vegetation, refreshing everything.

In the winter the thermometer, seldom below zero, is very variable; light snows are common, sometimes lying in the woods two or three weeks.

Approaching the mountain region, the summer heat is mitigated and the cold of winter is increased, and the temperature is more governed by the course of the winds, snow lying on the mountains till late in the spring.

The third division comprehends the limestone region of Upper Georgia.

For information from this region, I am indebted to Dr. Robert C. Word, formerly of Cassville, now of Rome. "There is no material difference," says Dr. Word, "in the geological features of the several counties. There is in each the same succession of broad valleys of rich fertile land, separated by intervening ridges, from one to several miles across, of various degrees of elevation, rising, in some instances, to the magnitude of mountains, originally covered by a dense forest, now rapidly disappearing. These valleys are well watered by streams fed by large springs, which gush up from beneath the substratum of limestone underlying the surface at various depths, throughout their whole extent.

"The rains of winter and spring fill the stratum of earth above the limestone with moisture, and give rise to innumerable temporary fountains (called wet weather springs) at the base and on the sides of the hills, and all over the valleys. These all flow into the permanent streams, and occasion a great disproportion in the height of their waters between wet and dry seasons.

"The stratum of limestone, and in many places one of alumina above it, presents a great obstacle to the absorption or ready penetration of the superabundant water deeply into the earth, and consequently there is excessive humidity of the surface, and in many places large pools of water, or shallow lakes of considerable extent, during the months of January, February, and March. The three succeeding months are generally delightful in temperature. The genial warmth of the vernal sun quickly evaporates the excess of moisture—the dreariness of winter is dispelled, and its fathomless abyss of cohesive mud forgotten in the contemplation of the gorgeous scene displayed with magical celerity by the luxuriant vegetation.

"The summers are by no means so depressing as upon the seaboard, or in the middle portion of the State. The thermometer occasionally, in the hottest part of the day, rises as high as 90° or 92° of Fahrenheit, but the nights are cool and refreshing.

"The same geological formation which favors the accumulation of water near the surface of the earth in winter explains also the remarkable absence of it during the months of August, September, and October, when, in dry seasons, the ground is parched and cracked in many places, the atmosphere filled with dust, vegetation languishing, and, where the stratum of earth is thin, totally destroyed; the temporary springs, branches, and lakes all dried up, many of the wells exhausted, and the water in the permanent

streams, reduced to its minimum, creeps sluggishly through the accumulated piles of drift-wood, which partially block up the channels through which it flows.

"The highest heat of summer is of short duration, and the temperature of the entire autumn is delightful.

"The two principal streams in this section of Georgia are the Oostenaula and the Etowah, which, meeting at Rome, in Floyd County, form the Coosa, a stream navigable for steamboats many miles into the State of Alabama.

"These rivers drain nearly the whole of the fifth congressional district, and are of great size, but not different in their circumstances from their smaller tributaries, though much of the alluvial land upon their banks, subject to inundation, is still covered with primeval forest.

"Throughout all the limestone region numerous sinks and depressions are observable on the earth's surface. Many contain water during the winter, but become dry on the approach of warm weather. Others are permanently filled with clear pure water. Subterranean caves are also numerous, especially in the counties of Cass, Walker, and Dade.

"The great alternations of moisture and temperature, so common to our winters, are probably due to the character of the prevailing winds, which are exceedingly variable, not unfrequently shifting their position to all the points of the compass in a period of less than twenty-four hours, each change in direction being attended with a corresponding change of temperature. The southeast winds, blowing from the Atlantic coast during the greater part of fall and winter, are attended with frequent rains, cold and penetrating in their effects upon the system. East winds are attended with cold drifting rains, and frequently with sleet; south winds with copious showers, not quite so cold; southwest winds with frequent showers, rather warm. As the wind approaches the west, the rain ceases, though the clouds continue until it reaches a point north of west, when the weather becomes fair and cool. Due north winds are very cold, though not usually of long continuance. Northeast winds are not common, and when they do occur, are apt to bring with them snow. In the spring, we have rains and passing showers from the west and southwest. In the summer, we have showers mostly from the west and northwest.

"Situated and forming the dividing line between the grain-growing sections of Tennessee and the cotton region of Georgia, the

limestone counties of Cherokee, Georgia, are not wholly unsuited to the production of either. Though best adapted to the growth of grain, grasses, and stock, the more southern counties have been found to produce abundant crops of cotton. The soil on the creek and river bottoms is rich with alluvial deposit. In many places, both in the valleys and more elevated country, the soil is strongly impregnated with iron, constituting the 'red' or 'chocolate' land, exceedingly fertile, but 'thirsty.'"

DISEASES, &c.—The diseases of the eastern part of the first division or tertiary formation of Georgia are thus treated of by Dr. P. M. Kollock, of Savannah, beginning with the Sea Islands:—

"The inhabitants enjoy a very great immunity from the diseases of the opposite main. And such as have few or no brackish ponds or lagoons, are more healthy than such as contain a greater number.

"In very wet seasons, the different forms of miasmatic and bilious fevers prevail to a considerable extent, but they are exempt from every species of malignant and fatal epidemics. I have never known cholera asphyxia to occur on any of the outer islands. In winter, sporadic cases of pneumonia are occasionally met with, together with ordinary catarrhal and pleuritic affections.

"The main opposite the Sea Islands is decidedly sickly, and infested by the various forms of miasmatic disease.

"In winter and spring, epidemic pneumonia, of typhoid type, is not unfrequent, particularly on the rivers and swamps. In summer and fall, the various forms of bilious fever, sometimes congestive, and occasionally exhibiting typhoid symptoms, prevail.

"Passing further inland to the region of sand-hills and long-leaf pines, the inhabitants enjoy a very large share of health, and when the possessors of the comforts of life, as regards shelter, food, and raiment, exhibit an *embonpoint*, a ruddiness of complexion, and contented, happy expression of countenance, seldom surpassed in any climate. As a general rule, they are strangers to epidemics of all kinds.

"In winter and spring, cases of pneumonia are met with, and in summer, particularly in seasons prolific of fruit, there may be dysentery; it is rare for severe cases of fever to occur in this section.

"The winter of 1852 was the coldest that has been known for many years in this district. Two snow storms occurred at Savannah, but very little rain. There was no great amount of disease—

a few cases of pneumonia occurred in my own practice—and I observed a very strong tendency to the formation of whitlows, resulting from slight injuries to the hands.

"Towards August, cases of fever began to multiply in the city of Savannah and its vicinity, and between that period and the month of November, very few of the laboring population escaped.

"During the month of August, some cases of yellow fever, accompanied with blackish discharges from the stomach, were reported; the number increased as the season advanced. The greatest number occurred as the season advanced to the month of October, when it proved fatal in almost every instance."

The yellow fever was but little known until after the war of 1812. It was not until the winter of 1816 that foreign shipping began to resort to Savannah, and the next summer the harbor was crowded; no care was taken to time the arrivals to the healthy months, and the seamen were strangers entirely unacclimated.

In the month of August, the yellow fever first broke out. It was confined to the seamen, and continued until the shipping departed; there were not many cases. During the following year, 1818, there were few arrivals, and all had left port before the summer had fairly set in, and there was but little sickness.

In the year 1819 many ships arrived, bringing a great many strangers, totally unused to the climate and unacquainted with the diseases to which they were exposed. Early in the autumn, the yellow fever commenced its ravages, and in less than a month the whole number of passengers who had been brought by one ship had fallen victims; the disease continued until cold weather, and was confined entirely to strangers.

In the beginning of the year 1820 a great part of the city was burned down, and the population was consequently crowded into the narrow limits left by the fire. The ruins were for the most part left in a state of total neglect, and many of the uncovered sinks and vaults remained open, exposed to the weather until they were filled up by the sand washed into them by the rain, which was more than usually copious in the latter part of the season. The excavations made for the foundations of new buildings were highly offensive, particularly during the night.

In the latter part of the summer, the yellow fever began, and increased to a frightful extent, but its ravages were still mostly among the unacclimated, few natives or old residents dying. The disease continued until late in the winter.

In 1821 the yellow fever began as in the year before, and now attacked the natives and old residents, more of whom died than did the year before.

The citizens were now thoroughly alarmed; a board of health was organized, and a system of visitation of the yards and buildings was put in operation; a new scavenger arrangement was made, and the city was thoroughly cleansed, so that the Cathartes aurea and C. atratus, commonly known as Turkey buzzards, which were as tame as barnyard fowls, and the most effective scavengers before, became wild. The yellow fever also disappeared, and for five years was not seen. The dread of its visitation seemed to have been forgotten, the members of the Board of Health soon became tired of their "useless" labors, and ceased to attend to their duties. An officer was appointed to inspect the lots, &c., but his visits soon became odious to those who most needed them, and the city became very exactly in the condition, as to cleanliness, that it was in before the beginning of the three years of fever. The Cathartes aur. and atr. returned, and in the early part of the summer of 1827 they were seen in the most populous part of the city fighting for offal in the street. Not long after this, the yellow fever made its appearance and carried off seven of the most prominent citizens, being all old residents, in rapid succession. This opened the eyes of the people to the necessity of a more constant attention to sanitary measures; the city was again thoroughly cleansed, the buzzards again took to the woods, and have never returned.

The yellow fever has not since been epidemic until the year 1854, when, the city being crowded with foreigners, mostly Irish laborers, it broke out again with such mortality as to produce general consternation; however, but few of the acclimated were severely attacked.

The epidemic spread more widely in the State than it ever had before.

In the autumn of 1834, the epidemic cholera commenced on some plantations twelve or fourteen miles above Savannah on the river, and gradually approached the city, where it continued for nearly two months, when it ceased its ravages very suddenly; negroes were the principal sufferers, and upon its appearance a few years afterwards, it was confined almost entirely to them.

Dr. O. P. Bealer, of Effingham County, in a communication to Dr. Kollock, in 1853, says: "The prevalent disease of the last

year, 1852, was typhoid fever, in the majority of cases, the result of neglected bilious fever; it was remarkably fatal; the deaths in this county the last year numbered more than those of any one year, as far back as the oldest citizens can recollect, and they were principally from typhoid fever.

Dr. T. R. Dunham says, that "the prevailing diseases of Camden County in winter and spring, are typhoid pneumonia and influenza. These yield during the summer and fall to diarrhœa, remittent and intermittent fevers, accompanied with the most violent headaches, and great irritability of stomach."

Dr. T. S. Hopkins, of Waynesville, writing of the diseases of the low lands in Glynn and Camden Counties, in the neighborhood of the Great Buffalo Swamp (which section, he says, is healthy in very wet or very dry seasons), in the year 1852, says: "The past season has been extremely wet, and I have only to report, for the spring months, a mild form of influenza, and for the fall, quotidian and tertian intermittents."

Dr. H. Briggs, of Troupville, speaking of Lowndes County, says: "The climate disease which manifests itself more or less, during some part of every year, is the remittent or intermittent malarial fever, usually of a mild form, but with occasional cases of malignant intermittent, congestive, algid, and other varieties of pernicious fever.

"Hooping-cough, mumps and varicella have repeatedly prevailed in all this region as epidemics.

"Scarlatina prevailed co extensive with the limits of the county during the years 1838 and 1839. It has appeared twice since, in 1844 and 1855, but could scarcely be considered an epidemic, either of the two last times.

"Abscess, in the form of whitlow, furunculus, anthrax, and deep-seated abscess, has sometimes appeared as an epidemic, more especially during the summer and fall of 1854, continuing several months, the ordinary climate fever disappearing altogether during the time.

"Dysentery appeared as the prevailing disease in the autumn of 1843, from which time till the spring of 1853, there were only a few sporadic cases. It has prevailed more or less at all seasons, and in all parts of the county from that date up to the present. In some neighborhoods the accompanying fever is of typhoid type, in others most decidedly inflammatory.

"Rubeola made its appearance in June, 1856, for the first time

since 1837. The disease was of a grave character, often attended with low form of fever, and dysenteric symptoms, often succeeded by a most obstinate diarrhœa, œdematous swellings of the lower limbs—a tendency to passive hemorrhages, and sometimes ulcerations and sloughing of the integument.

"Influenza, or grippe, often becomes epidemic. It seems to act as a predisposing cause of bronchitis, pneumonia, pleurisy and catarrhal ophthalmia. Sometimes a patient complains of violent pain in the head for a few hours without any signs of pneumonic inflammation, quickly followed by prostration, coma, difficult respiration from mucus accumulating in the bronchial tubes; death soon ensues.

"A continued fever prevailed in the western part of the county in the latter part of the year 1839, and first half of the succeeding year. Again in the southeastern part of the county, through all the winter and spring, from November, 1846, to April or May, 1847. A malignant fever and highly contagious typhoid fever have prevailed in some section of the county more or less every year since 1850; a half dozen or more cases in one family or neighborhood, then appear somewhere else. The county has not been entirely clear of cases of that variety of fever, but very few months in all the last six years.

"In the spring and summer it very much resembles ordinary remittent for a few days at first. In the colder part of the year it is usually without any regular remission, a straightout continued fever from the beginning.

"Puerperal fever is sometimes for a few months much more prevalent than at others; I do not, however, believe it has occurred as a true epidemic disease.

"The same is true as regards jaundice, uterine hemorrhage and many other non-febrile diseases.

"Dirt eaters and anæmic patients are always extant."

Dr. G. F. Cooper, of Houston County, in 1853, thus gives the prevalent diseases of that county, which may be taken as the sample of all the upper part of the first or tertiary division. "Rubeola, diarrhœa, dysentery, and idiopathic fevers," he says, "constitute the list of diseases which have been treated during the last year.

"During the months of April and May, we had an extensive epidemic rubeola, so called, and in some parts of our county it was attended with a fearful mortality. This was especially the case where a typhoid type obtained. Many of the cases which came

under our observation did not possess the usual characteristics of rubeola, and even those in which the eruption conformed nearest to the genuine form of the disease, desquamation did not follow. It appeared to me to be a blending, in many cases, of rubeola and roseola. The rubeolous eruption was evolved upon a roseolous base, the latter, I believe, appearing invariably first, followed by the papulous eruption of measles. The eruption usually appeared on the third or fourth day, and was shorter lived than in genuine measles, particularly in those cases where roseola prevailed, and was observed to be wanting in that crescentic arrangement laid down by authors. It also attacked a number who were known to have had rubeola previously. No age, sex or race was exempt. In those cases where roseola appeared, the attack was not accompanied by any catarrhal symptoms.

"In all cases there was an unusual proclivity to diarrhœa; this appeared to be independent of the eruption, for in many cases where it was standing out in full crop, diarrhœa would be persistent, with griping pains and vomiting, and not unfrequently, the former were exceedingly severe.

"It was also remarked that, after the entire subsidence of the eruption, the diarrhœa would continue for days.

"During the prevalence of this epidemic, there was a high range of temperature, the thermometer not unfrequently rising above 90°. Rains were frequent; it was almost continually cloudy, with a high dew-point.

"As is usual in wet seasons, intermittent and remittent fevers prevailed to a great extent, but we had less typhoid fever than the previous year."

The diseases of the lower part of the second or primitive geological division of the State vary considerably, according as the locality approaches the lower or upper limits of the old settlements below the mountains.

Dr. Winn, in a letter to Dr. G. F. Cooper, says: "in Monroe County they are free from the usually called 'local causes' of disease, and from their usual consequences, intermittent and bilious remittent fevers, and they have been very rare for several years.

"In the early spring and winter, we have a little pneumonia, catarrhal influenza, &c. In summer, enteric affections prevail, diarrhœa, dysentery, and cholera morbus.

"Our fevers of summer are those that have received among us the name of typhoid, though I must say I have seen none that I

thought approximated in its symptoms the specific typhoid fever of the books. But for all the cases that I have seen, I like better the title of nervous, for they all have wanted the enteric lesion, the large spleen, the eruption, &c.

"In fact, they have seemed to me entitled to be considered congestive fever, with cephalic tendency.

"Dr. Hood, of Harris County, says: 'In the spring of 1851, typhoid diseases became epidemic, and were the prevailing diseases until May, 1852, when we were visited with another and more fatal form of disease, though I considered it a modification of typhoid fever.'

"Another class, or modification of the same disease, prevailed at the same time, and with fearful fatality. It presented all the features of the foregoing, attended with frequent bloody sanious stools, recurring at regular intervals in many cases, in spite of all treatment; opium, morphine, tannin, acetate of lead, anodyne enemata, &c. &c., and continuing week after week, to death or recovery. The small bowels were evidently the seat of the disease; no griping or tenderness in the region of the colon or rectum."

Dr. Knott, of Griffin, Spalding County, communicating to Dr. Cooper, in 1853, says: "The most prevalent diseases among us in winter, are pneumonia, typhoid pneumonia, pleuro-pneumonia, bronchitis, inflammatory fever, rheumatism, neuralgia, &c. In spring, diarrhœa, especially among children, dysentery, among all classes, ages, and sexes. In summer and autumn, occasional cases of bilious fever, with a marked tendency from the first, to run into the typhoid form. The most remarkable feature of pneumonia, is its complication with the typhoid form of fever, and in some cases, not characterized by marked remissions or exacerbations. In all the cases of diarrhœa and dysentery, the bilious diathesis was present, consequently I directed my remedies to that function.

"In the treatment of typhoid fever, as well as pneumonia of like character, my reliance was upon mercurials, with a view to their alterative effect, and antimonials, as a sedative, combined with opium, aided by mild saline cathartics, and as valuable auxiliaries, counter-irritants."

In approaching the mountainous part of the second division, it is found that the diseases are more inflammatory in type, seeming to be more the effect of the great and sudden changes in the temperature and moisture, than of any local causes, especially in the

winter and spring months, but in some places spring intermittents, attributed to malaria, are frequent.

In the summer months, bilious remittents and intermittents are occasionally met with, and in wet seasons, diarrhœa, cholera morbus, and other disturbances of the digestive function, are not uncommon, especially during the greatest heat.

In the fall of the year, bilious fevers put on a more malignant form, most commonly with some one symptom, or some complication seeming to take the lead, and to give character to the disease in one year, and some other peculiarity in the next: thus, if in the commencement of a sickly season, we see a case of fever beginning with the usual feeling of lassitude, uneasiness, pain in the head and back, but with less flush on the skin, and the pulse not so full and bounding as in other cases, with slow deep breathing, and a torpid, careless state of mind, with constricted skin—"goose-flesh"—on the application of cold air or water to any part of the surface, indicating an irregular circulation, with determination to the deep seated bloodvessels—we have a case of congestive fever. And we are exceedingly apt to find it followed shortly by other cases very much like it. In fact, for some unknown cause, every disease of whatever kind, even if caused by mechanical injury, will show more or less proclivity to this same congestion.

Again, if in the beginning of the fall fever season, we see a case of urticaria running into fever, with great heat of the surface, anxiety, oppressed breathing, restlessness, and violent pain in the head and back, we have a case of "rash-fever," which will, most probably, tax our skill and industry to the uttermost: and will doubtlessly be followed by like cases during all the remaining season.

Thus, we have once in a while, an epidemic fever of one name, and then of another, as one symptom or another, or one complication or another may happen to prevail.

Scarlatina, rubeola, varicella, pertussis, parotitis, erysipelas, dysentery, and some other diseases of minor importance have prevailed as epidemics at uncertain intervals of time, in the whole of the primitive division of the State.

We now come to the diseases of the third division of the State, the transition, or blue limestone region; the last part of the State settled.

I am indebted to Dr. Robert C. Word, formerly of Cassville,

Cass County, but now of Rome, Floyd County, for all that I can say on this subject.

Dr. Word prefaces his account of the diseases of this country by a notice of the domestic habits of the people.

"Much of the disease," says he, "peculiar to the country is unquestionably due to a disregard of the laws of health. Imprudent exposure to the multifarious changes of climate, is the most frequent exciting cause of disease in the colder seasons. Though, of late years, it may be said that a majority of the inhabitants are well clothed, yet their houses are generally too open to furnish adequate protection from the chilling moisture of the winter season. Defective ventilation in cities is, perhaps, not more injurious to health than excessive ventilation in the country. Much of disease, also, may be attributed to cold, wet feet, consequent upon the muddy nature of the soil, for which the country is proverbial, and to which long custom has rendered the people careless and indifferent.

"As would be inferred, from the varying circumstances which we have mentioned, different diseases prevail during different seasons of the year, and furnish to the practitioner a more diversified experience than is found in some other localities. Catarrhal fever, rheumatism, pleurisy, pneumonia, and kindred phlegmasiæ, are common in winter and the early part of spring. Typhoid fever, a few years since, was only observed in winter, and is still most generally designated, in popular language, as winter fever. More recently, it has occurred also in summer and autumn. With the commencement of the heat of summer, a few sporadic cases of dysentery and diarrhœa make their appearance, becoming gradually more numerous, until they are so generally prevalent as to deserve the name of epidemic. Not unfrequently having so prevailed for a few weeks in June and July, they subside for a time, to reappear in a more fatal form during the autumn. A few cases of remittent and intermittent fever are met with in the early part of summer; they usually increase in number and violence as the season advances, and shortly before the return of cool weather, occasional examples of the congestive form of this disease are observed, rarely, however, at an earlier period. Not unfrequently these febrile attacks make their appearance during the suspension which has been remarked in the prevalence of bowel affections, and continuing conjointly with them, but attacking different subjects until the end of the warm weather.

"The autumn is marked often by the prevalence of influenza, of a mild form, which some persons have attributed to the great difference between the temperature of the days and nights at this period, and others to the constant inhalation of the dust, with which the atmosphere is loaded.

"The almost regular succession of annually prevalent maladies, and many others of occasional, but irregular occurrence, together with the marked peculiarities impressed upon all in particular years, or during particular seasons, by prevailing epidemical or atmospherical influences, exact an unusual amount of caution and practical tact in diagnosis.

"A few years after the first settlement of the country, malarious diseases were uncommon, inflammatory diseases more frequent than at present, the inflammation of higher grade, and vigorous antiphlogistic treatment better borne, and more successful than at present. With the clearing up of the land, exposing a larger surface, covered with a rich vegetable mould, and saturated with the rains of winter, to the action of a summer's sun, there has been a marked increase of all the affections which malaria is supposed to produce, and a very observable modification in the general sanative condition of the population, or in the character of many diseases which it is not pretended that malaria originates, but over which it appears to extend its mysterious influence. Many of the inflammatory attacks, occurring in winter in the last few years, have been found to assume the livery of this subtle morbific agent, evincing a decided tendency to periodicity, and demanding the administration of quinine. Many others, it is true, offer no such peculiarity, but are truly and frankly phlegmasiæ, requiring for their successful treatment free and bold employment of the lancet, and all the antiphlogistic expedients so familiar to the past generation of physicians. This intermingling of symptoms, blending of lights and shadows, is still more common in autumn and spring, and more embarrassing, because a just diagnosis is often difficult, and a mistake highly dangerous. To subject a patient previously enfeebled by miasmatic influence, or actually laboring under an irregular form of miasmatic disease, though simulating, with astonishing accuracy, an acute inflammation, to the debilitating effects of the antiphlogistic treatment, is not simply unnecessary, but, as has been too often sadly demonstrated, hazardous or fatal, producing prolonged debility, tedious convalescence, or else speedily, or more remotely death. To omit to do so, upon the other hand, when an

important organ is truly the seat of active inflammation, is to expose him to immediate peril, or to the doubtful consequences of the pathological changes by which that condition is followed. In a more malarious region, as well as in districts where the influence of malaria is less marked, the nice discrimination so often demanded here is, perhaps, less important, but the ability to make it, in this section, decides between success and the want of it.

"Tubercular disease, although it cannot be said to be prevalent amongst us, is by no means unfrequent. Tubercles in the lungs are more common than in more southern and less elevated regions, where there are fewer alternations in the weather, and less humidity. Experience has shown that the locality is not a good one for consumptive persons, or those who are predisposed thereto. Whether originating in the country, or introduced from abroad, the disease runs rapidly through its various stages to a fatal termination.

"Typhoid fever, I believe, made its first appearance in this part of the State in the winter of 1842, at which time a number of cases were seen in the immediate vicinity of Cassville. For a few years subsequently, the disease was confined entirely to the winter season, and it was not until about the year 1846 that it began to occur in the spring and fall. In the years 1846 and 1847, it prevailed extensively throughout the greater portion of Cass County. More than sixty cases came under our observation in those two years, and though the fatality was not very great, the cases were generally obstinate and tedious, running their course in a period of from three to six weeks, with a tendency to a favorable termination when unmolested by drastic remedies. Most of the fatal cases which occurred we believe to have been due to the injudicious use of purgative medicines, usually prescribed by the patients themselves before consulting a physician. Since the period above referred to, the disease has continued to prevail, varying in extent and violence at different times, and extending its baneful influence to other and milder maladies. Occasionally it breaks out afresh in different or in the same localities, complicated with features and peculiarities not previously observed. Many cases present malarial peculiarities, and are marked with tertian exacerbations. Others are complicated with pneumonia or rheumatism. It has been followed by the congestive form of the disease, which, in a large majority of cases, proved rapidly fatal."

Dr. T. J. Word, of Floyd County, in 1853, said that "typhoid fever has prevailed in Floyd as an epidemic for two or three years

past, mostly between the month of October and the beginning of spring, during which time it has taken the field to the exclusion of most other diseases, or compelled them to form an alliance with it. In the fall, it was occasionally associated with remittent fever; in the winter, with pneumonia. In the nervous, it was sometimes associated with neuralgia, and in the female, with hysteria.

"The cause of its general prevalence for a few years past can only be satisfactorily explained by admitting it to be an epidemic. Upon no other ground can we explain its appearance in regions where not one of the local or endemic causes exist to which its production has been ascribed.

"It occurs in the hilly and broken sections of the country, and in families who enjoy all the comforts of life, and are exempt from every apparent local cause of disease. Other causes than confined or vitiated air, decomposing animal or vegetable matter, or standing water, must be adduced, as it is known to occur in a malignant form where none of these causes exist. 'The presence of the typhoid principle in the surrounding medium exercises a controlling influence over the cause and duration of other diseases.' In further confirmation of this view is mentioned the increased or altered sensibility of the gastro-intestinal canal to the impression of cathartics, that part of the economy to which the force and violence of typhoid fever is directed. 'The smallest doses of the mildest cathartics have been known to occasion exhausting purgation.' 'That there has been for some time an epidemic constitution of the atmosphere, and that, under different states and temperatures, it may produce different effects, and give rise to a variety of morbid actions according to the predisposition of the system at the time, does not, I think, admit of a question of doubt.'

"Dysentery prevailed extensively in the years of 1851 and 1852. During the summer of the last, it was attended with a considerable mortality, especially among children.

"The inhabitants of the valleys and creek bottoms suffered most. The weather was warm and rather dry during the prevalence of the disease.

"During the epidemic last summer, diarrhœa prevailed also, and not unfrequently was found associated with dysentery in the same subject. Copious sanguineous or serous discharges would sometimes alternate with dysenteric discharges. This form of diarrhœa was usually very prostrating in its effects, and in some instances proved suddenly fatal. It was attributed by many to the cholera

atmosphere then supposed to pervade the greater portion of the United States. The occurrence of fatal cases of cholera morbus at the same time gave credibility to this opinion.

"The months of July and August seldom pass by without the occurrence of many cases of bilious dysentery, in some of which the influence of malaria is very perceptible.

"Influenza, or epidemic catarrhal fever, is of frequent occurrence. It may be said to be a regular visitant of the spring and fall seasons, each visitation being characterized by some new peculiarity. In the fall of 1851 a form of the disease prevailed, marked by the following symptoms: pain in the head, back, and extremities, cold shivering sensations, deep bronchial cough, and occasional slight fever. All of these symptoms were worse in the early part of the day. The weather was dry, but had been preceded by heavy rains; previous to the rains there was a great drought.

"Neuralgic affections are quite common in this country. They appear generally to be of malarious origin, and yield to quinine, cupping, &c. In the colder seasons the disease is frequently blended with rheumatism, and appears to be developed by exposure to cold and damp weather. The facial variety is most common."

I have now finished the work assigned to me, to the best of my ability, and hope that it may meet the views, and fulfil the requirements of the Association.

And now, also, I make my acknowledgments, gratefully, for the assistance which I have received from those gentlemen of the profession who have given me the benefit of their knowledge.

To Dr. P. M. Kollock I am indebted for most of the part belonging to the neighborhood of the sea, and through his instrumentality to Dr. Bealer, of Effingham, Dr. Dunham, of Camden, and Dr. Hopkins, of Wayne County.

Dr. H. Briggs, of Troupville, Lowndes County, communicated all that I have given of Southwestern Georgia.

I owe to Dr. G. F. Cooper, of Perry, Houston County, much of what I have said of the upper part of the first, and lower part of the second division.

Dr. Robert C. Word is my authority for all concerning the third or limestone division.

I have endeavored carefully to distinguish the parts due to each contributor, as vouching for the correctness of whatever I have written, whenever it was not from my own observation.

JOHN F. POSEY.

REPORT

ON THE

USE OF CINCHONIA IN MALARIOUS DISEASES.

BY

F. HINKLE, M.D.

REPORT ON THE USE OF CINCHONIA IN MALARIOUS DISEASES.

LOCATED in the midst of a malarious district of country, where intermittent, remittent, and bilious fevers prevail during the autumn, and often during the major part of the year, I have presented to me an extensive field for observation and experiment, with every facility for testing the curative powers of the various remedial agents which may be brought to the notice of the profession for the treatment of miasmatic diseases, I have thought that the result of my experience with cinchonia as an antiperiodic agent would not be unacceptable to the profession.

Miasmatic fevers, frequently complicated with diarrhœa and dysentery, are the predominant diseases of our vicinity; they are principally confined to the laboring classes, who are more exposed to the malaria.

The pure alkaloid and sulphate of cinchonia was introduced to the notice of the profession by Professor Wood, of the University of Pennsylvania. Since the year 1849 I have been prescribing it as a substitute for quinia. The alkaloid was procured from Powers & Weightman, manufacturing chemists, Philada. It was administered in the form of pill and solution during the apyrexia, the dose being graduated according to the age and sex—two, six, twelve, and twenty grains being prescribed as the case might require, which acted promptly and efficiently, arresting the chill generally after the first, and invariably after the second or third dose. The time for complete convalescence proved

On the fourth day in quotidians,
" " ninth " " tertians,
" " twelfth " " quartans,
" " eighth " " remittents.

In each case the average attendance was from four to eight days. The tendency of the disease to return at weekly, bi-weekly, and

tri-weekly periods was not so frequent as when quinia had been used; this probably was owing to its universal administration, the system becoming more or less unsusceptible to its action, it failing in ordinary ten to twelve grain doses, unless the dose was increased, at each subsequent period of its administration, five or ten grains. Quinia, also, being high in price, the pecuniary circumstances of many would not admit of their purchasing sufficient to effect a permanent cure.

The alkaloid cinchonia has proved itself in my experience to be equal, if not superior in its action on the system, to quinia in the treatment of intermittent, remittent, and typhoid fevers, and in all periodical diseases in which quinia has been heretofore thought unparalleled.

Without entering upon a lengthy detail, I present a few facts as observed. It is less stimulating, milder in its action, less nauseous, and more acceptable to the stomach, than quinia; it does not produce fulness of head or headache, tinnitus aurium, and deafness. In children under twelve years of age it produced, in at least thirty cases that came under my observation, a peculiar erythematic hue of the skin, which confined itself to the face, thorax, and upper extremities, and continued from one to two hours, while the patient was under its full influence; this was observed more in the female than the male sex. The above phenomena were generally sufficient to alarm the family, who would send for me in great haste; finding the pulse slow, averaging from eighty to eighty-five, brain clear, pupils active, skin not unusually hot, no danger was apprehended and no treatment required; after noticing it in several cases, I generally informed the patient that an increased action of the capillary circulation frequently resulted from its use.

It is with pleasure that I can testify and recommend to the profession the substitute of cinchonia for quinia, after a thorough and impartial trial of it for the last six years.

The formulas used were as follows:—

℞.—Cinchoniæ gr. xx;
Pulv. acaciæ,
Syr. simplicis, ää q. s.—M.
Ft. pil. no. xx.

I gave two, three, or five pills, as the case required, every two hours. In cases in which the paroxysms were early in the morning, I gave ten in the evening and ten in the morning. In cases in which the stomach was very irritable, morphiæ acetat. gr. ¼ to ½,

pulv. capsici gr. j to ij, were added with success. In a majority of cases, it was given in solution.

℞.—Cinchoniæ gr. xx;
Spt. æth. nit.,
Syr. simplicis, aā ℥ss;
Acid. tannic. gr. iij;
Ol. limon. gtt. j to ij.
Sig.—Give one to two teaspoonfuls every two hours.

From ten to fifteen grains were given in the form of pill or solution on the seventh, fourteenth, and twenty-first days after the last paroxysm. As a tonic, one to two grains were given every three to six hours, to promote digestion, give tone to and invigorate the system. For anæmia and neuralgia, it was combined with Vallet's mass, tr. ferri chlor., vegetable extracts, &c.

For anæmia and debility—

℞.—Pil. ferri carb. gr. xx;
Cinchoniæ gr. xv;
Ext. hyos. gr. vj.—M.
Ft. pil. no. xx.
Sig.—One every three hours.

For neuralgia, the result of anæmia—

℞.—Cinchoniæ gr. xx;
Tr. ferri chlor.,
Tr. cinnam. comp., aā ℥ss.
Sig.—Five, ten, to twenty drops every two to four hours in water.

In sciatica—

℞.—Cinchoniæ gr. xx;
Chloroform ℥ss;
Glycerine ℥j;
Morph. sulph. gr. j.
Sig.—Half a teaspoonful every four hours.

In cases of nervousness and hysteria—

℞.—Cinchoniæ gr. xx;
Ext. cimicifugæ ℈ij;
" valerian. gr. viij;
" lupulini gr. x.—M.
Ft. pil. no. xxxvj.

For neuralgia in the supra-orbital nerves, &c.

℞.—Cinchoniæ gr. xx;
Strychniæ gr. $\frac{1}{12}$;
Zinci valer. gr. x;
Ext. anthemidis gr. vj;
Morphiæ acet. gr. j.—M.
Ft. pil. no. xl.
Sig.—One pill every three hours.

The following table will show the number of ounces prescribed during each year:—

In 1849	cinchonia	1 oz.	
" 1850	"	6 "	
" 1851	"	12 "	
" 1852	"	6 "	
" 1853	"	28 "	
" 1854	"	45 "	
" 1855	"	37 "	
" 1856	"	18 "	
To April 1st, 1857	"	12 "	165 oz.
	Sulphate of cinchonia		20 "
		Amount	185 "

Dr. Wm. Pepper, in an article published in the *Amer. Journal of Med. Sciences*, Jan., 1857, on his experience in the use of the sulphate of cinchonia, states that he has used it in fifteen cases with the most signal success in the treatment of intermittent fevers, &c. Dr. Kenderdine, the resident physician in the Hospital of the Protestant Episcopal Church in Philada., also states, in a communication dated Oct. 7th, 1854, addressed to Powers & Weightman, that he has used the sulphate in over three hundred cases of malarious fevers of various types successfully. The experience of the physicians quoted above prove conclusively that the sulphate of cinchonia is a remedy for intermittent fevers, fully as efficacious as the sulphate of quinia. My experience in its use fully confirms the evidence given above.

I can fully recommend the use of the pure alkaloid cinchonia in all periodical diseases, neuralgic affections, and debility following acute diseases, it proving, in my experience, quite as efficacious as quinia, and, in many cases, more prompt. I have preferred the pure cinchonia to the sulphate, owing to the latter being more nauseous, and less acceptable to the stomach.

I think that the evidence I have had of the efficacy of the pure alkaloid justifies me in believing it equal, if not superior, to quinia, and I feel confident that the profession will sustain the evidence given of its efficacy after giving it a fair and impartial trial.

Respectfully submitted by

F. HINKLE.

REPORT

ON THE

BLENDING AND CONVERSION OF TYPES IN FEVER.

BY

C. G. PEASE, M.D.,

JANESVILLE, WIS.

REPORT ON THE BLENDING AND CONVERSION OF TYPES IN FEVER.

No disease, since medicine became a science, has demanded, or received so much attention as fever, and, perhaps, there is no one upon which, at the present time, so great a diversity of opinion is held by the profession. This diversity pertains alike to the cause, essential nature, and just treatment of the disease. This difference of opinion is, perhaps, mainly owing to our inability, or rather the impossibility, of presenting any definition sufficiently exact and comprehensive to suit such an infinite variety of forms; and so long as our knowledge of the essential nature of this disease is as limited as it is to-day, it will be equally impossible to obtain any single description implicating all its varieties. Since all are agreed as touching the main features of this disease, which features are present more or less in all its forms, I infer that there is some one essential condition or state of the system, forming a common point of departure for all its varieties. It is this condition in which Holland finds the bond by which to associate together numerous forms of disease, and which Paine declares to be the general pathological cause of all fevers. This is that primordial condition, without the existence and presence of which, whatever may be the affection of the system, it cannot be called *fever*.

What is the essential nature of this condition or state, and how far it is modified by the full development and continuance of the disease, may not be satisfactorily known. Virchow says, "Fever consists essentially in elevation of temperature, which must arise from increased tissue change." Dr. Stokes regards it "a condition of minus vitality;" Sir James Murray, "a disturbed electrical state." Whether the truth lies in either or all these opinions, or in some direction not yet conceived of, our present knowledge does not determine. It is evident, the phenomena which characterize the different forms of the disease, must depend upon the character of

the producing agent—the degree of force, or the peculiar mode of its action, and the channel through which its effect is wrought. Similarity of results may depend upon the relevant character of the agents, or the similar effects which opposite causes may produce in the system.

As two or more causes may be operative at the same time, the concurring phenomena will *blend* in proportion as the causes are relevant, or the state of the system which each is calculated to produce, is identical. So also, when opposite or irrelevant causes are operative at the same time, the increased potency of the one may completely obliterate the effects of the other, which were at first, perhaps, most apparent, and thus a complete conversion of phenomena take place. As this general principle is applicable to the causes of all disease, it obviates the necessity of showing the possibility of such a result, in the class called fevers.

That this result obtains in an especial manner in this class of diseases, will be doubted by none, save those who regard all causes as specific, and the forms of disease which result from their operation as so many isolated, distinct individualities.

The most superficial consideration of the causes of disease would lead us to separate them into groups or classes, according to their origin, nature, or effects. The diseases which result from these causes, though they may be readily classified, and the distinctions easily recognized, rarely present phenomena indicative of the causes which produce them. That diseases widely differing in their character may result from the same causes, is beyond a question. The causes of fever, though sometimes specific, are in the main of a general or incidental character. The influences universally admitted to be capable of exciting this disease are cold, heat, moisture and aridity, acting by every possible combination in every possible abnormal degree upon the system—great atmospheric vicissitudes, want of fresh and wholesome food, fatigue and surfeit, noxious gases arising from the decomposition of vegetable and animal matter—human effluvia arising from crowded and unventilated rooms, and from persons already diseased, some undefined electrical state, and in epidemics some general atmospheric influence. It is clearly impossible by the most rigid examination of these causes to determine from them what form of disease will result, or what kind of phenomena it will present.

Grainger boldly asserts "that the same deleterious agents which will develop the exciting cause of fever, will develop scarlatina,

smallpox, diarrhœa, cholera, and the whole class of zymotic diseases."

If, therefore, we cannot by any consideration of these causes determine the form of the disease, we certainly gain nothing by attributing it to any unknown specific cause, the existence of which out of the imagination, is as uncertain as the properties attributed to it are vague and incomprehensible. Miasm and malaria are very convenient terms, and proper enough, if we allow them to stand as the algebraic x and y for anything which future investigation shall prove to be an exciting cause of fever.

That fevers do arise from the operation of these general causes is certain; but that the state which we call fever is any more likely to result from them, than any other distinct forms of disease remains to be proved. We must look, therefore, to the potency of the cause, and the channe . through which its effect is wrought, that is, the part of the system primarily affected, for an explanation of the phenomena which distinguish the various forms of the disease.

The strong tendency which the opinions of medical men have toward the revival of the humoral pathology, has done much to strengthen a very prevalent idea, localizing fever in the blood. That the blood is the primary seat of the disease, or rather the channel through which the disease is produced in its specific forms, as scarlatina, measles, contagious typhus, and some others, is, perhaps, susceptible of proof. The phenomena attending some other forms of fever, very much strengthen the opinion of Virchow and others, viz., that primary changes are wrought in the nervous system. Both opinions are, doubtless, true in different cases.

There is certainly a very close connection between the nervous system and the febrile diathesis. Many of the phenomena are referable only to the nervous system. Among these are apathy, depression, exhaustion, shivering, contraction of the superficial vessels and the skin, increased action of the heart, and elevation of the temperature of the body. Another marked feature characteristic of this disease, is its periodicity. The great similarity of the nervous action, and the action of electricity in those organized bodies possessing this peculiarity, is striking. The periods of action and repose are as well marked in the one case as the other.

That the nervous system is implicated sooner or later in all forms of fever, I think none will deny. That the nervous symptoms vastly preponderate in the early stages of some forms, while they

appear later and apparently secondary in other forms, will, I think, accord with the experience and observation of most practitioners. By comparing the well-marked nervous symptoms which usher in some forms of fever, with the phenomena which attend the experiments of Bernard, which result from the section of nerves, and referring or uniting these phenomena to those causes, thought to be so potent in the production of nervous or periodic fevers, and we have a strong warrant for the inference, that in this form of fevers the primary effect is upon the nervous system.

The supposition that in some forms of fever the primary effect is upon the nervous system, and the effect upon the blood secondary, and that in some other forms the effect of the fever-making agent is primarily upon the blood, and its action upon the nervous system secondary, does not by any means explain the manner by which the poison is introduced into the system, neither does it affirm or deny the supposition that it enters at all as a specific entity.

From our knowledge of the phenomena of this disease, and the circumstances under which it makes its appearance, we are justified in the opinion that some forms of fever result directly from the introduction of the poison into the system, while in other forms, by the action of deleterious agents upon the nervous system—by the disturbance of electrical currents, or from some other, perhaps, unknown influence, the poison is a result of this influence, and is generated in the system.

I need scarcely mention the great rapidity by which changes are wrought in the system, and by which that which to-day is blood and in circulation, is to-morrow a constituent of some solid organ, supplying the place of material now re-converted and returned in a fluid state to the circulation, and the controlling influence which the nervous system possesses over these changes, to show the relation which a diseased state of the blood, or of the nervous system must have upon the integrity of structure and function, of the so-called solid organs; indeed, if the solids of the body are but the "fixed blood," it is impossible but that the altered blood should leave the impress of its own imperfection upon the organ of which it forms a part. On the other hand, since the blood supply, the tissue change, both in the supply of new material and the elimination of the effete, and the degree and force of the circulation are under the control of the nervous system, it is impossible but that any derangement here should tell upon the integrity of every other part. It is impossible to isolate any form of disease altogether.

Especially is this true of fever. The change wrought by the fever-making agent is a change ultimately upon the whole system. In consequence of the impure and imperfect condition of the blood, the solids suffer. The condition of one organ is the condition of all the organs so far as the fever is concerned. Fever has consequently no anatomical character—it is a state.

Some of the conditions concerned in the production of this state have an important bearing upon this part of this report.

Are the several forms of fever the result of a specific cause, each for each, or may the same form of fever, that is, the same febrile state, result from a variety of causes? If the fever making agent has the properties of a poison, and enters as an entity into the system, we can expect as a consequence only specific effects, always the same in kind, the degree being a measure of the intensity of the poison, or the receptivity of the patient.

Leaving out of the question the existence of miasm as an entity, and using the term as expressing anything that can be productive of either of the forms of nervous fever, if this cause is a specific one, then it should follow that wherever we know that a person has been exposed to its influence, we must expect, if it produce any disease at all, some form of nervous fever. If, again, any, or all combined, of those influences, so generally acknowledged to be the cause of typhoid fever, have the properties of a specific poison, we must have, whenever these are in operation, typhoid fever, and that alone as the result.

On the contrary, Hyslop, and others, record many cases of severe gastric disease produced by miasm. Diarrhœa and dysentery are forms of the frequent manifestation of this influence (Jones). Copeland says rheumatism may result from it. The frequent occurrence or intercurrence of paroxysms of neuralgia and intermittent fever is well known. McCullock records the case of a family in which a part of its members were attacked with intermittent fever, and a part with paralysis. Partial paralysis is a frequent result of this influence. Idiocy, in one or two instances, is referred to the same cause; congestion of important organs, as of the liver, lungs, spleen, and brain, are often attributed to the same cause. On the other hand, the noxious effluvia generated in towns, in the filthy, crowded hovels of the poor, if not considered essential, yet is so powerful in the production of typhoid fever, is also an efficient cause of intermittent fever. Hasbeyah, in Syria, is notorious for the obstinate character of its intermittents. Wor-

tabet, in his paper on the fevers of Syria, says: "After a long and careful examination we can assign no adequate cause for the prevalence and obstinacy of the fevers of this place but its filthy streets, houses, and habits of the people." The same author asserts that there are many other places entirely free from miasmatic influence, where the nervous forms of fever are frequent, and often severe.

Take the other side of the question.

If the disease is specific, the cause must be specific, so that when the disease is present we may refer its production always to the same cause. Thus, we must attribute the production of a nervous fever always to miasm, though miasm may produce a thousand other forms of disease. Typhoid fever must be referred to noxious gases, impure air, or whatever may have been the cause of this fever in any one instance.

The opposite is true in both these forms of fever. The various forms of nervous fever are the frequent result of exposure to great atmospheric vicissitudes, where it is impossible to refer it to miasmatic influence (Casselbury). Wood, in speaking of the results of local inflammation, says: "The fever partakes of all those diversities incident to fever arising from other sources. In relation to type, it may be intermittent, remittent, or continued; it may be sthenic or asthenic, and in severity, from the least possible derangement to the greatest malignity. Watson (*Practice*, p. 95), after enumerating a class of symptoms consequent upon extensive inflammation, says "this is typhoid fever." Todd says the continued fevers are the result of an overdose of the fever poison. For a fever, commencing as a pure intermittent or remittent, to pass steadily on from one degree of severity to another, until it assumes a genuine typhoid type, accords with the experience of many medical men. Hyslop, in a work on the medical topography of Mohamreh and Bussorah, near the Persian Gulf, says: "They are both situated on creeks, on a low and alluvial soil, and surrounded with swamps. Fevers are very prevalent. They are common in summer, but more general and fatal in autumn. Intermissions are seldom seen, and remissions are rarely obtained. Organic visceral complications are almost universal, the liver and spleen being chiefly affected, and not unfrequently the disease assumes a malignant, typhoid type.

We conclude from the foregoing that the causative agents are

not necessarily specific in their character, nor is the particular form of fever the specific result of a particular cause.

That from their action is produced a certain indefinable condition of the system, which may be called the febrile diathesis. This diathesis differs from the physiological state from the least possible departure from the standard of health to a degree incompatible with life. The phenomena which determine the type of the fever determine, more or less perfectly, the channel through which the effect is wrought, and measure the degree of departure of the febrile state from the healthy standard. The phenomena in a case of intermittent and in a typhoid fever have scarcely the slightest resemblance when first fully developed. But when this intermittent has passed on from one degree of severity to another, the blood becomes involved, the phenomena become more and more alike as the state of the system in the two cases becomes more and more identical, until it becomes difficult, if not impossible, to distinguish between them.

On the other hand, the typhoid fever, when, through the poison of the blood, the nervous system becomes involved, presents, more or less, the phenomena of the remittent. This is particularly true in cases of recovery, the remissions frequently becoming quite perfect. Moreover, the complications which occur in the two forms agree in kind, as the state of the system in the two cases becomes identical. The congestions or inflammations which are so common and appear so early in the nervous fevers, do not appear in the other fevers till the nervous system becomes involved, and then the same organs are the points of attack.

What the particular change wrought by any deleterious agent upon the system is, and the precise manner in which the change is effected, is not, perhaps never will be, known. That the effect of all agents, whether general or specific, is essentially the same, is altogether probable. Many, with great propriety, think this change a condition of impaired nutrition. The phenomena of the disease mainly accord with this supposition. If this is true, we are certainly not driven to the necessity of referring each separate form of the disease to the action of a specific poison. It is easy to see how the opposite general causes may produce essentially the same effect upon the process of nutrition. Those influences which act so directly upon the nervous system, deranging its functions, impairing its energy, debilitating or shocking it, must interfere with the process of nutrition, for this process is under the control

of the nervous system. Those influences which tend so directly to impair the blood, which deprive it of its oxygen, which prevent the elimination of its carbon, or impede its circulation, must interfere with the process of nutrition, for it is through the blood that this process is carried on. The impairment of the nutritive functions is probably not all the change effected by the fever poison; but how far the other changes are dependent upon this is difficult to determine.

It is through this general effect which various and dissimilar causes have in lowering the standard of vitality, and thus producing a state or diathesis in all forms of the disease essentially the same, that we are to find an explanation of the great similarity of phenomena, that we so often see occurring in cases having so widely different origin.

I have written thus at length of causes and effects, not because I could advance any new truth, but because they furnish, to me, the only reasonable ground of explanation of the fact implied in the subject of this report. The disposition on the part of some authors to individualize each form of fever, both as to cause and effect, seems to me to preclude the possibility of any blending or conversion of types. A process of displacement or substitution would be the only possible change. Two diseases may, indeed, be concurrent, and particular symptoms may be intercurrent, as heat of skin, increased action of the heart, or some form of delirium; but it is clearly improper to call this agreement in symptoms a blending of the types of the disease. Diseases do not blend—forms of the same disease do. We say then of fever, whatever may be its form, or with whatever other disease it may at any time be associated, it is simply fever. It is not a neurosis, it is not a phlegmasia, and however similar or closely allied the febrile diathesis may be to any other diathesis, it has its own unmistakable characteristic.

The foregoing remarks must not be taken as a denial of the existence or efficiency of specific agents, in the production of fever. Such evidently is the nature of the contagious elements, which enter as a specific poison (if indeed it is a poison) into the blood. How this poison acts upon the blood, is a question still *sub judice*. The animalcular theory has its supporters. There are very strong reasons for the opinion, that its action is that of a ferment. These contagious elements only pass from persons already diseased, and produce the same specific form of disease. In this respect they are

all alike. By what complication of causes this result was produced, it is not possible to tell. That the contagion was produced in the system from the effect of general causes, in the first instance, is beyond a doubt, and has the power of reproducing itself, so that each person diseased becomes himself a centre for the diffusion of the poison. A wide difference of opinion prevails as to how far this contagion is a characteristic of fever. Dr. Stokes thinks it is true of all fevers; others confine it to very narrow limits.

Most writers divide fevers into groups or families as affording the most easy and natural mode of description. The phenomena of the various forms justify this division. The following appears to me the most natural classification, viz: 1st. Nervous fevers; 2d. Blood fevers that are not exanthematous; 3d. Exanthems.

I am aware that this classification is of the most general character. It is for this very reason that I prefer it. Fever is a disease, between the forms of which very finely drawn lines of distinction are not applicable. These classes have many points in common, but as they will appear as distinctly in the description of individuals under the several classes, I shall omit them here.

Much of the apparent discrepancy among writers has arisen from the indiscriminate use of medical terms. Thus the term "bilious" is made to apply to almost every possible derangement of the hepatic functions. Type is another term to which writers seem to have assigned a significance to suit their own particular purposes. Profiting by this general license I shall use the word *form*, as nearly synonymous with *class*, and the word *type*, as signifying the individual under the class. By this means, the name of the type designates also the class to which it belongs. This term is also used to denote the grade, or other peculiarity of the fever, when that peculiarity forms an essential feature of the disease. Thus in intermittents we say it is a tertian or quartan type, and of grades, we say it is mild or malignant.

Under the classes as named above, are included the following types:—

1st. Class.	2d. Class.	3d. Class.
Intermittent,	Simple Idiopathic,	Variola,
Remittent, and	Typhoid, and	Scarlatina,
Bilious continued.	Typhus.	Rubeola.

This by no means includes all the types of fever as presented by

authors, but as these are the most common and most important, they answer the purposes of this report.

Yellow fever, though as important as any in its relation to other types, seems not to possess the peculiarities of either class exclusively, appearing at one time closely related to the first, and at other times to the second class. Dengue, and some other varieties of fever possess a similar complex character. The idea that two diseases, whether relevant or not, cannot affect the system at the same time, but that, by a sort of antagonism, they kill each other, has no foundation in fact. Indeed so common is the opposite of this true, that a purely simple form of disease, seems the exception rather than the rule. As regards fevers when prevalent in a particular locality, the utmost confusion of types and grades is often witnessed. Some are intermittent, others remittent, others from the potency of the cause present the continued form. The intermittent becomes malignant, congestive, remittent, continued, typhoid. What appears sporadic to-day is to-morrow epidemic. A similar interfusion of types, obtains under the second form, as under the first. The simple pyrexia, if long continued, seldom retains its simple character, and as the severity of the affection increases the simple fever becomes a typhoid, or perhaps a typhus.

It by no means follows, that the more simple or mild types are the necessary precursor of the more severe. The malignancy of the intermittent may mark its very onset. Typhoid may be typhoid in the beginning. The grade of fever is a measure of the potency of the cause, or the receptivity of the patient. That there is a marked and essential difference between the types of continued fever, there can be no doubt. That this difference is a difference in the state of the system, and not in the cause or nature of the disease, I am fully confident. Many writers use the terms typhus and typhoid indiscriminately, I do not say with propriety. It frequently happens that, of a large number of persons subject to the same influence, a part will suffer from typhoid, and a part from typhus. "On the Rio Grande (Power, quoted by Bartlett) a vessel which imported seventy cases of typhus, had also many cases of typhoid." The origin of the two forms may frequently be traced to the same locality. They both appear epidemically. Dr. Christison says, "The typhoid has repeatedly appeared and disappeared as a subordinate or intercurrent epidemic on the more general epidemic of typhus."

A similar interchange or blending of types occurs among the

individuals of the third class. Drake saw many cases of scarlatina with catarrhal symptoms, and measles with anginose symptoms. One case in which scarlatina appeared in the convalescence from measles. Dr. Eslep, of Canton, Ohio, says he saw in the same family one patient with well characterized measles, another with scarlatina, equally distinct, and a third with the two diseases confounded. Dr. McKelvey (recorded by Drake) saw a case in which the rash for two days was that of scarlatina; it disappeared, and was immediately succeeded by measles—the fever being common to both maladies. Drs. Fearn and Severt saw them so mixed up that it was impossible to refer them to either head. A case is recorded in Hall's practice, in which scarlatina began and continued for a few days, when measles set in, and run its regular course; after which the scarlatina again appeared and completed its course. Dr. Ames records a case, in which the eruption of scarlatina and measles appeared on alternate days. Scarlatina appeared on the third and fifth days and measles on the fourth and sixth. The patient died on the sixth day. The various forms of variola, varioloid, and varicella are often indistinguishable, and other varieties of the exanthems are sometimes intercurrent with these.

But this blending of the types of fever is not confined to individuals under the same class. The phenomena attending each of any two classes, often appear in the same case. Drake, Bartlett, and many others, speak of the periodic class, assuming the typhoid appearance. Most writers speak of the typhoid *element* as being present, sometimes, in all the forms of eruptive disease. The continued fevers, often, as recovery takes place, are intermittent or remittent. Dr. Drake makes use of the following language: "We sometimes see a typhus fever with such a morning abatement as inspires hopes of an early intermission. At other times we have an early development of typhus symptoms, when the locality and season of the year clearly indicate the presence of the remote cause of autumnal fever. In some autumns, almost every case terminates by crisis, or in the intermitting type; in other seasons, a large proportion, after the first week, display a typhus character." As to the character of these cases, he says he has not been able to detect any pathological difference, nor is he aware that any of our physicians have. Dr. Boling reports cases of intermittents, having the symptoms and peculiar lesions of typhoid. Holland speaks of typhus conjoined with intermittents. Roussell of typhus and measles. I have a case now under treatment of erysipelas

with typhoid complications. In the fall of 1856, I attended a family of nine persons, all sick of fever at the same time. In the first case there were slight remissions, and a severe diarrhœa, which, after a day or two, was completely checked—apparently cured. At the end of the third week, hemorrhage from the bowels occurred, reducing my patient to the lowest degree. From this he recovered so as to be able to sit up; after three weeks a second hemorrhage came on, and he sank so rapidly as to be moribund before assistance could be obtained. Case 2d was remittent during the first week, when typhoid symptoms supervened. There was a dark furred tongue, tenderness of the bowels, diarrhœa, tympanitis, and low, muttering delirium. Case 3d was remittent throughout, yet with some typhoid symptoms, as dark tongue, slight tenderness of abdomen, and diarrhœa; recovering at the end of the third week. Cases 4th, 5th, and 6th, were typhoid from the beginning, the enteric symptoms and the peculiar typhoid eruption being present in all three. Case 7th was bilious remittent, with congestion of the lungs. Cases 8 and 9 were continued fevers without complication, one lasting two, and the other three weeks. Although all these became sick before any one of them recovered, no local cause could be discovered on or about the premises. I have seen one or two cases of relapse after remittent or simple pyrexia become typhoid. I might add, from experience and from authors, evidence to any amount to prove the *fact* of the blending of the forms of fever. I am of the opinion that this blending of types occurs much more frequently than formerly. In the Northwest, where pure intermittents or remittents were once common, it is rare now that we meet with a remittent unattended with typhoid symptoms. This may be thought owing to the settlement of the country, typhoid being a disease of towns rather than of thinly populated districts. But an opposite fact does not admit of a similar explanation, namely, that at the East, where typhoid is of common occurrence, and the periodic fevers rare, there has been a like increase of remittent fevers, and of remittent and typhoid conjoined.

Yellow fever, while it has strong claims to be regarded as a distinct disease, has a better claim to stand at the head of a class of fevers of a complex character. Whether its nature is best understood by supposing it a remittent or a typhoid, augmented and altered by some specific cause to a form and malignancy peculiarly its own, or whether it is itself a disease *in re*, but appearing so frequently as it does conjoined or blended with one or the other of

these forms of fever, is not certain. Dr. Langley describes an epidemic of bilious remittent assuming a typhoid type, which, before the close of the season, proved to be yellow fever. "It was then," he says, "admitted to have been yellow fever from the beginning." Yellow fever is described as intermittent, remittent, and congestive. A yellow fever with typhus is not infrequent in the West Indies. Intermittents terminate in yellow fever, or take on this type when patients are brought from the country into towns where the latter prevails. From the history of many epidemics it appears that yellow fever was frequently preceded, and often followed, by fevers of a remittent or continued type, in some of which there was a gradual, in others a sudden change of type. In one case, on shipboard, a severe typhus broke out, which suddenly changed to yellow fever, and, on their arrival in port, again assumed the typhus type. Bryson furnishes a great variety of facts showing the relation of this type to the more common and remittent forms.

We now turn to consider the fact and nature of *conversion*. Of this, Dickson, in his report, gives the following examples. He says, in cases "beginning with the ordinary symptoms of climatorial autumnal bilious fever, one shall retain its periodical malarious character, ending, as it began, with the features of a simple remittent; another, losing these features in a protracted course, shall grow more and more continuous, and ultimately put on all the appearances of maculated typhus, with dry, dark tongue, mouth, teeth, and gums blackened with sordes; or present the meteorism and abdominal disorder of typhoid, with intestinal ulceration shown *post-mortem;* and a third shall sink promptly into a profound collapse, dying with orange-yellow discoloration of the skin and eyes and black vomit." Better examples could not well be given. Taking it for granted that the changes in the disease, of which the above are examples, do occur, I do not see how the possibility of their occurrence can be explained but upon the supposition, not that the cause, not that the forms, but that the essential nature of the disease, upon which the forms depend, is in all the same. If a case begins with all the symptoms of bilious fever, and goes on gradually increasing in severity until it puts on all the appearances of maculated typhus, what is there in the nature of the case which obliges us to believe that here are two diseases, the result of two distinct causes? Is not an uncomplicated disease, putting on all the appearances of maculated typhus, a maculated typhus? or does the fact that it began as a bilious fever determine

it to be a simulative disease, and not the real? Is not this a distinction without a difference?

I do not by any means assert that the state of the system is the same in all forms of fever. The state of the system differs widely in its departure from the standard of health when a single organ is diseased from what it is when this diseased action engages every organ in the body; but it is a difference in degree, not in kind. So, when those causes, which act primarily upon the nervous centres, produce a periodic fever, the state of the system is far different from what it is when, as a result of this disturbed action, the blood becomes involved; and, in the incipiency of this change, again from what it is when the blood becomes so altered by disease as to give rise to the maculæ of typhus or the black vomit. But these are differences in degree only. On this ground, *conversion* of type is not only possible, but capable of explanation. Nor does the fact that some fevers result from contagion conflict with this idea. If typhoid or typhus fevers are contagious at all, they certainly are not from the beginning, the contagious element being generated in the course of the disease. In the periodic fevers, as the blood becomes involved, the peculiar nervous symptoms disappear, and the symptoms peculiar to blood fevers become manifest. The depraved blood now becomes itself a cause sufficient to complete the process of innervation. We decide upon the nature of a disease from the condition of our patient, with little or no reference to the cause of it. Of two cases of typhus, one may originate from contagion, the other from some other cause. We do not declare the one or the other a case of typhus because it is or is not the result of contagion.

Nor does this supposition, that types *may* depend upon changes wrought in the system as the direct result of the disease, conflict at all with the idea that special causes are productive of particular forms of fever, as typhus from the decayed wood of ships, or the accumulation of filth on board, or decayed fruit. It is quite as easy to comprehend how the effluvia from these various sources may depress the vital powers to a given degree by destroying the integrity of the blood as that the same identical poison should be generated from them. Indeed, the search after specific causes for results which may be rendered so infinitely various through the agency of the vital forces has, so far, served to create difficulties rather than remove them. I cannot see the propriety, much less the necessity, of asserting, when a case, beginning as a bilious re-

mittent, "puts on all the appearances of maculated typhus," that there has been superadded to the cause of the remittent the *peculiar poison* of typhus. That the milder forms of fever are predisposing causes of the more severe is generally admitted. The same agents which produce the milder types, acting in conjunction with the fever, become increasingly potent depressing agents as the power of resistance in the vital forces diminishes, and may of themselves occasion a change of type. A new deleterious agent may, in the same manner, in addition to its own special influence, give potency to previously existing causes, and so hasten the transition from one type to another. I cannot admit, therefore, until it can be satisfactorily proved, that a particular form of fever can arise only as the result of a special poison—that conversion of type is occasioned alone by one poison overpowering or supplanting another.

As to the fact of conversion, Dr. McArthur says many cases of remittent terminate in endemic yellow fever. Dr. Thomas Reyburn says typhoid fever often supervenes in well-marked, regular bilious remittent fever; in other instances the symptoms of the two fevers are so interfused as to render the distinction as to which form predominates a matter of difficulty, if not of impossibility. Landor says that fevers on the Gold Coast are markedly intermittent, in bad seasons remittent, and in cases rapidly fatal, continued. But these changes are not peculiar to any locality; they occur more or less frequently in the experience of most medical men. Would numbers add to the value of this testimony I might cite cases from authors to any extent, but this must suffice.

REPORT

ON A

NEW PRINCIPLE OF DIAGNOSIS IN DISLOCATIONS

OF THE

SHOULDER-JOINT.

BY

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REPORT ON A NEW PRINCIPLE OF DIAGNOSIS IN DISLOCATIONS OF THE SHOULDER-JOINT.

HAVING for a number of years inculcated in my lectures the principles contained in this paper, I was requested to reduce my views to writing, for the benefit of our classes, and accordingly published an article on the subject in the March number, for 1856, of the *Southern Medical and Surgical Journal*, p. 131. The object of this communication is to present the American Medical Association with a brief exposé of this interesting subject, and to accompany my remarks with pictorial illustrations, calculated to impress the eye as well as the understanding of the reader.

The principle of diagnosis to which I refer may be enunciated in the following language: If the fingers of the injured limb can be placed by the patient or by the surgeon upon the sound shoulder, while the elbow touches the thorax, *there can be no dislocation;* and if this cannot be done, there *must be* a dislocation. In other words, it is *physically impossible* to bring the elbow in contact with the sternum or front of the thorax if there be a dislocation; and the inability to do this is *proof positive* of the existence of dislocation, inasmuch as no other injury of the shoulder-joint can induce this inability.

In order to make these propositions apparent, I beg leave to present drawings taken from the skeleton, showing the relative position of the bones in the natural state, and in the several dislocations of the shoulder. The evidence thus obtained in support of my principle, would be still stronger if the bones were invested with their normal coverings and attachments.

Let us then look at Fig. 1, and we may observe, that while the head of the humerus occupies the glenoid cavity, and the fingers rest upon the other shoulder, the elbow and lower end of the humerus lie upon the thorax without difficulty, because of the circumstance that the head of the humerus, when in its natural position, is removed several inches from the ribs. In consequence of

the rotundity of the thoracic walls it is physically impossible that both ends of the humerus should at the same time come in contact

Fig. 1.

with the chest. We see, therefore, in Fig. 1, that in the absence of any dislocation, the *upper half* of the bone does not touch the thorax, and that the *lower half* does so without the least difficulty.

Fig. 2.

By now referring to Fig. 2, which represents a dislocation into the axilla, we find that, the fingers being placed upon the opposite

shoulder, the elbow is forced so far forwards that it *cannot* touch the thorax. In this state of things, the upper end of the humerus alone touches the ribs, while the lower end is proportionately removed from the chest. Any attempt to force the elbow against the thorax must be fruitless, unless at the expense of a disruption of all the soft parts by which the head of the humerus is held down; for, as I have already stated, it is *physically impossible* for both ends of the humerus to touch the thoracic walls at the same time.

We have represented, in Fig. 3, a dislocation forwards or below

Fig. 3.

the clavicle; and here again we find the *upper end* of the humerus resting upon the ribs—the elbow being consequently removed from the chest. The *upper* half of the humerus touches the thorax, and so long as this is the case, it is physically impossible for the *lower* portion of the humerus also to do it. In dislocations of this kind, it is very difficult to carry the fingers upon the opposite shoulder, even though the elbow be allowed to project forward, because of the resistance offered by the strong muscles which pull back the humerus. I have, however, represented the bones of the skeleton in this position, for the purpose of showing the effect, in case it could be assumed, in the living subject.

Dislocations of the humerus upon the dorsum of the scapula, although very rare, should still be carefully studied. I have, there-

fore, represented this accident in Fig. 4, by which it may be seen that the same principles are applicable also to it. Here, as well as

Fig. 4.

in the other instances, it is only the *upper end* of the humerus that touches the thorax, and the elbow projects strongly forwards. In this dislocation, it might be possible to bring the elbow against the side of the trunk, by carrying the humerus down parallel with the axis of the body; but any contact of the elbow with the chest is impossible, if the fingers be directed towards, or placed upon the sound shoulder, for then the form of the thorax would offer an insuperable obstacle.

Having now, I trust, sufficiently demonstrated the truth of the proposition that it is *physically impossible* to bring the elbow against the front of the thorax in dislocations of the shoulder, I would simply add, that it is equally true, that no other injury of the shoulder-joint than a dislocation can induce this physical impossibility. It is obvious, that a mere contusion of the soft parts may render motion of the joint so painful as to deter the patient from the effort necessary to carry the fingers upon the other shoulder. But there can be no difficulty on the part of the surgeon in placing the limb in this position, and an anæsthetic might be used, if desirable, so as to render manipulation painless. The same may be said of fractures of the upper end of the humerus, of the acromion, of the coracoid process, and of the neck of the scapula. In neither of these accidents can there be any physical impediment in the way

of bringing the elbow in contact with the front of the chest, for in neither of them can the *upper end* of the humerus be so fixed against the ribs as to make it impossible for the *lower end* to touch the chest. Nothing, therefore, but a dislocation can prevent the limb from being placed in the position indicated.

If it be justly esteemed a matter of great importance to be in possession of correct principles of diagnosis in occult diseases, it is certainly not the less so with regard to surgical accidents, especially when these demand prompt interference. Our professional records unfortunately establish too conclusively the imperfection of our diagnostic resources in injuries of the joints, to permit any indifference on the subject. If, therefore, the views here presented may facilitate, in the least degree, the detection of injuries confessedly more or less obscure, my object will have been attained.

Augusta, Ga., April 25, 1857.

REPORT

ON THE

FAUNA AND MEDICAL TOPOGRAPHY

OF

WASHINGTON TERRITORY.

BY

GEO. SUCKLEY, M.D.,
U. S. ARMY, FORT STEILACOOM, W. T., OCT. 1, 1856.

REPORT ON THE FAUNA AND MEDICAL TOPOGRAPHY OF WASHINGTON TERRITORY.

I. GEOGRAPHICAL DIVISIONS OF THE TERRITORY.

WASHINGTON TERRITORY extends from the dividing ridge of the Rocky Mountains to the Pacific Ocean. Its southern boundary, east of Walla Walla, is the 46th parallel of north latitude, west of which point the Columbia River forms the line. The northern limit of the Territory is the 49th degree of north latitude, the dividing line between the possessions of Great Britain and the United States, on the Pacific. This extensive tract of country can be, for description, conveniently divided into three geographical sections. These are the *Eastern*, or Rocky Mountain region; the *Central*, and the *Western*, or Coast district, each of which presents marked peculiarities.

1. THE ROCKY MOUNTAIN SECTION.—This extends from the dividing ridge of the main chain to the valley of the Spokane River, and embraces in it, besides the Rocky Mountains proper, the Bitter Root Mountains, and a more western range, called recently the Cœur d'Alêne Mountains. On the whole, this section is emphatically mountainous, and moreover, well watered and heavily timbered. The geological formations of the region are extremely interesting, consisting *principally* of primary stratified and unstratified rocks. Auriferous shales and talcose slate occur in abundance on Clark's Fork of the Columbia,[1] and gold bearing quartz is said to exist in the vicinity of Hell Gate River. Good *lead ore* is found on the Kootenai River, and further[2] to the north, in the same mountain range, it is said that copper and silver are found. The absence of either secondary or tertiary fossils in this portion of the territory is worthy of remark, yet in the same mountain ranges, in the vicinity of the South Pass, out of the limits of Washington

[1] Commonly known as the Colville "Mines."

[2] See De Smet's Oregon Missions.

Territory, it is said that secondary fossils exist. Perhaps they may yet be found within the limits of the present section.

Some of the loftiest mountains of this region are extinct volcanoes, now, for the most part, covered by perpetual snow.

The presence of these masses of frozen snow accounts for much of the cold weather experienced in summer. This *Alpine* summer is short and cool, night frosts frequently occurring. This I state on the authority of a worthy Roman Catholic missionary, the Rev. Adrien Hœcken, who has spent twelve years in these mountains. He informed me, that in the vicinity of Lake Kalispellum (Lake Pend Orville), rain occurring on a summer day, is almost invariably followed by a night frost. This, however, is not the case in the larger valleys.

I here append a summary of the meteorological observations for one year, taken by Lt. Jno. Mullan, U. S. Army, while stationed in the St. Mary's valley, a fine rich river-bottom, lying between the Bitter Root and main chain of the Rocky Mountains. It affords me great pleasure to testify to the perfect reliance which can be placed on anything of the kind reported by the said efficient officer. As the point where these observations were taken is almost central in the section, they are of greater comparative value in determining the general climatic characteristics of the region.

Summary of Temperature Observations at Cantonment Stevens, St. Mary's Valley Lat. 46° 20′ 10″ N. Long. 113° 55′. Altitude (from barometric means), 3412.5 feet.

[Extracted from the Pacific R. R. Reports (quarto ed.), vol. i. p. 598.]

DATE.	TEMPERATURE MEANS.							
	7 A. M.	9 A. M.	2 P. M.	7 P. M.	9 P. M.	Means.	Max.	Min.
1853								
October (21 days)	39.5	...	53.6	...	44.5	45.9	69.0	20.0
November	32.5	...	38.6	...	31.2	34.1	57.0	17.0
December	28.1	...	35.4	...	27.0	30.2	55.0	3.0
1854								
January	12.1	...	16.0	...	11.8	13.3	52.0	—29.0
February	28.1	....	37.4	...	28.2	31.2	46.0	14.0
March	37.8	41.9	46.8	36.7	33.4	39.3	61.0	22.5
April[1]	45.9	49.4	54.0	49.7	42.5	48.3	74.0	31.0
May	53.2	59.8	62.7	56.3	49.3	56.3	80.0	36.0
June	62.7	67.1	71.5	63.7	56.3	64.2	86.0	49.5
July	65.2	71.8	80.0	70.6	...	71.9	94.5	53.5
August	66.9	72.3	81.1	70.3	...	72.6	96.0	56.0
September (17 days)	54.4	57.5	60.4	54.6	...	56.7	69.0	49.0

[1] April: last 15 days at Horse Guard Camp.

Barometric means of all: at 7 A. M., 26.482; 2 P. M., 26.444; 9 P. M., 26.446. Mean, 26.457.

Temperature means for the year: Spring, 47.97°; Summer, 69.57°; Autumn, 44.57°; Winter, 24.96°; Year, 47°.

From the Isothermal charts, published in the admirable report on the Meteorology of the United States, made under the direction of Brig. Gen'l Thos. Lawson, Surgeon General U. S. Army, compiled by Dr. Richard Coolidge, U. S. Army, and Prof. Lorin Blodget, the mean temperature for each season at Fort Owen, St. Mary's valley, is as follows, Fahrenheit's scale being used:

Spring 40°.	same as that of	Northern Vermont.
Summer, 60°.	"	"	St. John's, N. B.
Autumn, 45°.	"	"	Northern New Hampshire.
Winter, 25°.	"	"	S. Ext. New Foundland.
Year[1] (about) 42°.	"	"	" " "

There are many strong reasons why a more careful number of observations should be yet instituted in the open valleys, for several successive years.

On the 4th of August, 1854, we find, according to Lt. Mullan, there was the highest temperature indicated, by the out-door thermometer, at his encampment in St. Mary's Valley, during the period his observations were taken, the mercury standing at 96° in the shade, at 2 o'clock P. M. On the 20th of January, in the same year, at 7 A. M., the thermometer gave the lowest reading taken at any of the standard periods, the mercury, at that time, standing at —22°, giving a range between the extremes of heat and cold of 118° of Fahrenheit.

St. Mary's Valley certainly possesses the advantage of centrality in position, and being the only point in this section at which a set of systematic meteorological observations throughout an entire year have ever been made, I have used the data thus furnished as an approximative means of getting at the climatology of the whole section.

Among the mountain ranges which surround this valley a much greater depression of temperature is met with. On the 16th of the same month that Lt. Mullan found the coldest temperature at Fort Owen, viz: —22°, Lt. Grover, who was at a point not far from the dividing ridge (probably about ninety miles further in the mountains), found a temperature at sunrise of —38°, a difference of 16°. Mere altitude will not account for this difference. It is probably

[1] Lt. Mullan's report gives the mean annual temperature, at 47°.

owing to the fact the St. Mary's Valley is about fifteen miles wide, and quite open. This allows the sun its full effect at mid-day, besides which, the mountain ranges rise so abruptly from each side of it as to shelter it greatly.

Vegetation.—The vegetation of these mountains is decidedly Alpine. In the valleys, quite a fair proportion of different species of plants occurs; but the species in their sylva are comparatively more limited. The forests in the main chain of Rocky Mountains, within the limits of Washington Territory, are interspersed with prairies and openings, looking much like the pasture lands of unsettled districts in the Eastern States. These open lands have probably been produced by fires at former periods. Here the forests are themselves not so dense as those of the second chain (Bitter Root Mountains), but they are, in both ranges, composed essentially of the same trees, principally coniferæ. Among these are several species of the *true* pines, as well as several species of firs, including hemlock and spruce, also the Oregon "white cedar,"[1] or thueja gigantea of Nuttall. I did not find this plentiful until, on going west, I reached Lake Kalispellum, and I do not remember seeing it in the main chain at all. From Lake Kalispellum to the coast, wherever the soil and climate will permit, it is found, generally growing in rich spongy ground, and rarely found standing alone.

Among the deciduous trees of this section, of which I noticed but few species existing, the western larch, or larix occidentalis, is most abundant. "Hard-wood" trees are comparatively scarce, and principally consist of wild cherry, maple, and a hawthorn, which is probably the Russio-Asiatic species, crataegus sanguineus, noticed by Lewis and Clark in these mountains.[2] Among the "soft-wood" *deciduous* trees, I noticed willows and cotton-wood most abundant, growing always near the streams. Berries of several kinds abound, which, when dried, together with several indigenous bulbous roots, form staple articles of diet with the Indians of the country.

2. THE CENTRAL SECTION.—The central section presents geographical features of great interest, and even of wonder. It embraces all that portion of the territory lying between the Spokane River and the dividing ridge of the Cascade Mountains, and is bounded by the northern and southern limits of the territory.

[1] For an excellent description of this noble tree, see Nuttall's N. A. Sylva—a continuation of Michaux's great work on the Forest Trees of North America.

[2] *Vide* Nuttall's North American Sylva.

Except a narrow belt of timber on the southern and eastern slopes of the Cascade Mountains, another on a small spur of the Blue Mountains, of Oregon, near Walla Walla, and, again, a strip of forest lying along its eastern limits, in the vicinity of Fort Colville, this section is almost absolutely timberless. It is composed principally of bare elevated plains and ridges, sparsely covered with vegetation, and presents, on the whole, a picture of desolation, only rivalled in horror by the Southern Desert or Borcal Waste.[1]

Geologically, it consists of a vast area of country, the basis of which is principally an enormous bed of basaltic trap and lava, thinly covered by a soil of its own detritus, a sharp, glistening, barren sand, rarely rich enough to allow the formation of a sod or of useful vegetation.

This bed of trap, in cooling, originally was traversed by multitudes of cracks and fissures, of unequal magnitude and extent, forming, according to size and depth, ravines, deep dry caverns, and watercourses, bounding unbroken masses and ridges, which have become rounded from the action of the elements, giving a hilly appearance to the country, which is, in reality, a vast elevated plateau, heavily grooved in the manner just stated.

The Columbia River traverses this region in an immense chasm or crack. Its banks of terraced basalt reach nearly perpendicularly, in many places a thousand feet high on each side. To these vast gloomy pictures of exaggerated desolation, the clear, sparkling waters of this noble river, for hundreds of miles, form an agreeable contrast.[2]

Connected with the geological characteristics of this section, are many interesting facts in its medical topography. Among these are the occurrence of alkaline springs and lakes (frequently productive of renal and intestinal complaints), which are found throughout almost the whole section. I regret that specimens of these waters have not been heretofore preserved for analysis, as, for the

[1] In fact, this section embraces the northern portion of this singular and immense region of the interior of North America. For a description of this, and some very sensible deductions concerning its etiology and extent, I refer those interested to the Report on the mean annual precipitation of rain in the United States, *vide* Army Meteorological Register, p. 757, and regarding more especially the portion under consideration. See p. 761.

[2] For an able and concise report on the general geological features of this remarkable region, I refer those interested in the subject to the excellent article written by George Gibbs, Esq., which is incorporated in the Report of the Survey of the Northern Pacific Railroad Route, vol. i., Pacific Railroad Reports, p. 473.

above reasons, and because in certain places they exert a marked influence on vegetation, their existence presents a peculiar feature in the history of the region.

The general geological features of this section extend far south of the limits of Washington Territory, and as there is an almost unbroken communication with portions of this great tract lying in a warmer latitude, it is not surprising that we find a great northern prolongation of species, in both its fauna and flora, of a decidedly southern type. Special allusion to these points will be made in a subsequent place. In connection with the peculiar geological regulations in this region, are parallel peculiarities in its meteorology.

The meteorological observations taken at Fort Dallas, Oregon Territory, although taken at the western verge of this section, are valuable, as being the only records in this department of science which have been kept in the interior. Fort Dallas is at the western verge of the central section of Washington Territory, although out of the limits of the latter *one mile*, or the width of the Columbia River, still, for the reasons already given, I have thought it best to incorporate, in this paper, its meteorological data, as approximative examples of the general climatic peculiarities of the section under consideration. Fort Dallas is moreover *strongly impressed* with the climatic characteristics of this section—somewhat modified, however, by its proximity to certain snow-covered peaks in the Cascade Range. Although proximity to mountain ranges causes a marked increase in humidity and reduction of temperature, especially where there are peaks of perpetual snow in the vicinity, yet this disadvantage in the position of the point of recorded observations, tends to confirm the statement that the central sections of Oregon and Washington Territories are essentially and markedly different in climate from the eastern or western. Still, I infer that, should systematic meteorological observations be hereafter made further in the interior, say seventy-five miles further distant from Mts. Hood, Adams, and Jefferson, this difference, as shown by tables of observations, will be much more manifest, the climate more warm, and the annual fall of rain much less.[1]

[1] The statistics at Fort Dallas show a very small amount of annual rain, but remarks on the tables of rain given will be made, in comparison with the same of the western section, and are, therefore, deferred for the present.

Consolidated Table and Summary of Monthly Means of Temperature, the Result of Observations taken during the six years ending June, 1855, *at Fort Dallas, O. T.* Lat. 45° 36′ N. Long. 120° 55′ E. Altitude, 350 feet.

[Extracted from Army Meteorological Register, 1855.]

January	33.09	October	53.61
February	40.01	November	41.33
March	46.45	December	33.66
April	52.98		
May	59.58	Spring	53.00
June	67.09	Summer	70.36
July	73.22	Autumn	52.22
August	70.77	Winter	35.59
September	61.71	Year	52.79

Series of Monthly and Annual Measurements of Rain at Fort Dallas, O. T., from July, 1850, *to June*, 1855, *inclusive.*

[Extracted from Army Meteorological Register.]

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Spring.	Summer.	Autumn.	Winter.	Year.
1850	..	..	..	..	..	..	0.01	..	0.09	0.91	1 14	0.19	..	..	2.14	..	..
1851	3.81	1.70	1 79	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1852	..	..	..	..	..	..	..	..	..	0.25	2 75	3.01	..	..	..	..	..
1853	3.02	1.09	0.27	1.29	0.62	..	0 06	0.61	1.41	0.24	4.90	0.95	2.18	0 69	6.55	5.06	14.48
1854	2.79	0.73	0 36	1 52	..	0.15	..	0.18	0.84	1.91	1.41	2.50	1.88	0.33	4.16	5.02	11.39
1855	3.03	0.63	1.87	0.17	1.08	0 24	..	..	..	..	..	..	..	..	..	..	..
Mean	3.16	1.04	1.07	0.99	0.57	0.13	0.03	0.26	0.78	0.83	2.55	2.91	2.63	0.42	4.16	7.11	14.32

NOTE.—These tables are more interesting from the fact that Fort Dallas is at the verge of the northwestern limit of the great arid region of interior North America. Forty-five miles west of Fort Dallas, at the Cascades of the Columbia, rain occurs on nearly 250 days in the year; and I have but little doubt that the amount of annual precipitation at that point, if accurately measured, would amount to fully 70 inches!

THE WESTERN SECTION.—The third or western section of Washington Territory embraces the remainder of the country lying between the western limit of the central section and the Pacific. The dividing line of these two sections is very abrupt, crossing the Columbia River from north to south at a point a little below Fort Dallas, O. T., being in this vicinity a little to the *eastward* of the dividing ridge of the Cascade Mountains; but, further to the north, it more strictly follows the line of their division. This line appears to be followed with great exactness by nature in the distribution of her fauna and flora, a necessary result of the sudden change here found between the meteorology and even geology of the two regions.

The geography of the western section is somewhat intricate, owing to the diversity in its geological character. It contains a portion of the Cascade Mountains, and near the coast is traversed by the Coast Range, occasionally called in the territory the "Olympian Range." Besides these mountains there is a region of low country lying between them, and also a narrow strip of low seashore bordering the Pacific. The low country is further diversified by variations in soil and situation. In this section, we have the strip of alluvial on the right bank of the Columbia, most of which is subject to overflow; the rich bottoms of the Cowlitz, Cathalamet, and Chehalis Rivers, the gravelly prairies at the southern end of Puget Sound, the islands and semi-maritime region of Admiralty Inlet and the Straits of Fuca, and the Alpine districts in the mountains and their spurs. The "rocks in place" are, for the most part, markedly different from those in the other sections,[1] and vary considerably in different situations.

According to Mr. Geo. Gibbs, in MSS. to me, the Cascade Range may be generally stated as *volcanic*. Two of the four principal snow peaks in this territory, Mt. St. Hèlens and Mt. Baker, are so far active as occasionally to emit smoke and ashes. Basalt and volcanic sandstone occur throughout the whole range; the latter forming apparently the predominant rock. South of Mt. Rainier, trachytic rocks also are prominent, but these seem to disappear to the northward of that peak, the boulders in the streams not indicating their presence. In the main Sakama Pass, silicious conglomerates were observed, and north of that point, the primitive rocks, such as gneiss, sienite, and granite, make their appearance. Porphyry was observed in the neighborhood of the Okonagan Lake, about the 49th parallel. Of the western side, nothing is known north of the Sakama Pass. South of that, the character seems to be the same as that on the eastern.

Of the Coast Range, within this territory, nothing is known. The rocks which make their appearance on the shore at Fort Ludlow, Puget Sound, are of dark hornblende. It would seem that the tertiary formation extends along the whole margin of the Pacific and along the Straits of Fuca, encircling, as it were, the Coast Range.[2]

[1] This remark does not apply to the Cascade Range, which is in common to this and the central section.

[2] At Anaimo, Vancouver's Island, near the coal mines, tertiary deposits are abundant; also at the mouth of the Columbia River. These facts confirm Mr. Gibbs' statement.—G. S.

The banks of the Columbia, after it has debouched from the Cascade Mountains, are for a long distance low and subject to a periodical inundation, which is generally at its height by the 15th of June. After the subsidence of this freshet, much stagnant water is left in lagoons, from which malaria is, in most seasons, generated. This overflow, unlike that of the Nile, does not leave a fertilizing deposit.[1]

The meteorological peculiarities of this region are markedly interesting. The uniformity of its climate in the settled districts, the mild, cloudy, rainy winters, early spring, cool summers, and the heavy amount of annual rain precipitation, all possess interest to an observing mind.

The presence of several lofty snow peaks distributed throughout this section causes a manifest impression on the climate of the adjacent country. To the existence of these mountains many attribute the almost total absence of electrical storms in the low country and adjacent maritime districts. Such storms, on the contrary, are quite frequent among the mountains themselves.

This section, in its meteorological relations, is almost the opposite of the central. Statistics show this plainly, but the facts are so obvious, even to the most uneducated settler, that figures are scarcely necessary for the support of the statement.

Consolidated Tables and Summaries of Thermal Observations taken at Forts Vancouver and Steilacoom, W. T., showing the Means of each Month from the Recorded Observations taken for six years, at those Forts, ending June 30, 1855.

[Extracted from Army Meteorological Register.]

	Fort Vancouver.	Fort Steilacoom.		Fort Vancouver.	Fort Steilacoom.
January . . .	40.56	38.67	October . . .	53.30	52.35
February . . .	41.66	40.58	November . .	46.51	44.97
March	44.14	42.90	December . .	36.51	39.26
April	52.55	48.88			
May	58.95	55.84	Spring . . .	51.88	49.21
June	62.67	60.65	Summer . . .	65.65	62.89
July	68.71	64.23	Autumn . . .	53.54	51.69
August . . .	65.56	63.80	Winter . . .	39.54	39.50
September . .	60.81	57.75	Year	52.65	50.82

Fort Vancouver, W. T.—Lat. 45° 40′. Long. 122° 30′. Altitude, 50 feet.

Fort Steilacoom, W. T.—Lat. 47° 10′. Long. 122° 25′. Altitude, 230 feet. Corrected from published abstracts.

[1] See Gibbs' Geolog. Report, P. R. R. Reports, vol. i. pp. 42–3.

Consolidated Series of Monthly and Annual Measurements of Rain at Forts Vancouver and Steilacoom, W. T., giving the mean Monthly Measurements, in inches, for the six years ending June 30, 1855.

[Extracted from Army Meteorological Register.]

	Fort Vancouver.	Fort Steilacoom.		Fort Vancouver.	Fort Steilacoom.
January . . .	9.62	9.54	October . . .	2.55	4.28
February . . .	3.38	5.16	November . .	6.76	8.25
March	3.79	4.56	December . .	6.69	6.81
April	2.74	4.77			
May	2.75	1.86	Spring . . .	9.28	11.19
June	2.68	1.97	Summer . . .	6.23	3.85
July	2.85	0.34	Autumn . . .	10.30	15.20
August . . .	0.70	1.54	Winter . . .	19.69	21.51
September . .	0.99	2.67	Year	45.50	51.75

NOTE.—The Steilacoom record is incorrect. A mistake was kept up for the last four years by means of an incorrect reading of the scale. It gives the hepetal precipitation much in excess. The true average of rain falling at this post is probably in the neighborhood of 35—perhaps 38 inches.

The mean annual measurement of rain at Fort Dallas for the time observed, as already given, is 14.32 inches, not *one-third* of that of Fort Vancouver, which amounted to 45.50. Fort Vancouver gives a very good example of the general character of the climate in the western section of Washington Territory, and also affords a striking comparison to that of the central section, when its meteorology is compared with that of Fort Dallas. It is but ninety-five miles from the latter place, on the banks of the same river, and is three hundred feet nearer the level of the sea. It is also nearly on the same parallel of latitude, as the following will show.

Fort Dallas	45° 36′ N.
Fort Vancouver	45° 40′ N.

The amount of rain is not the only climatic distinction between the places. The spring and summer of Fort Dallas are warmer, and the autumn and winter colder, than at Fort Vancouver. The annual mean, however, is nearly the same.

Another interesting point of difference between the two localities is the absence in the western section of the prevalent high boisterous winds so commonly met with in the central section, especially on the line of the Columbia River during the warm months. This wind is interesting in a surgical point of view, as being a cause certainly aiding in the production of the vast number of cases of

pterygia of the conjunctiva found among the older white settlers, Indians, and even lower animals, inhabiting the central section.

As a startling comparison, showing the difference of climate between the central and western sections of Washington Territory, and the vicinity of the great Lakes in the older States, a table is here introduced, made up from those in the Army Register, already quoted, in which the mean annual summary of temperature for three posts, nearly on the same parallel of latitude, is given.

	Fort Vancouver.	Fort Dallas.	Fort Mackinac, Mich.
January	40.56	33.09	19.37
February	41.66	40.01	17.60
March	44.14	46.45	25.68
April	52.55	52.98	37.03
May	58.95	59.58	47.47
June	62.67	67.09	57.31
July	68.71	73.22	64.55
August	65.56	70.77	64.05
September	60.81	61.71	55.08
October	53.30	53.61	45.17
November	46.51	41.33	34.30
December	36.51	33.66	23.12
Spring	51.88	53.00	36.73
Summer	65.65	70.36	61.97
Autumn	53.54	52.22	43.85
Winter	39.54	35.59	20.03
Year	52.65	52.79	40.65

Fort Vancouver.—Lat. 45° 41′ N. Altitude, 50 feet.
Fort Dallas.—Lat. 45° 36′ N. Altitude, 350 feet.
Fort Mackinac, Mich.—Lat. 45° 51′ N. Altitude, 728 feet. (Mean of 24 years.)

FAUNA.—The fauna occidentalis Americana is at present exciting considerable attention among naturalists. The labors of the naturalists attached to the various surveying and exploring parties fitted out by government within the past five years, and of others who from enthusiasm and devotion to these subjects have traversed the wilds of Western America, have recently added a vast amount to our previous knowledge. The habits, peculiarities and locations of many rare species have been observed, new genera and species have been discovered, and much valuable information regarding the characteristics and geographical distribution of both rare and common species obtained.

The fauna of Washington Territory is fully equal to that of any other western region in interest. Most of the species that are found in this territory are common to Oregon also. In both we

find the northern limit of southern types, and the southern boundary of those particularly confined to the north. A very interesting fact is noticed in the wedge shaped prolongation northward, in the central geographical section of these territories of southern zoological types. This, the collections sent to the Smithsonian Institute by Dr. Cooper, Dr. Newberry, and myself, amply verify. This peculiarity I also noticed in Northern Nebraska, in the vicinity of the Upper Missouri and Milk Rivers. Upon glancing over Prof. Blodget's rain and temperature charts, as published in the volume of *Meteorological Statistics* already referred to, the reasons for this arrangement are manifest, and in both regions these wedge shaped prolongations of the southern fauna are directly in keeping with similar encroachments of southern meteorological phenomena.

Another peculiarity in the fauna of our northwest, is the inclination towards the Asiatic types. The character in fact of both the birds and the mammals of this whole region seems to resemble more those of Eastern Asia than those of the Atlantic districts of America. This, in regard to its ornithology, is not surprising, when we consider the proximity at the north of the two continents, and also the power of birds to traverse wide intervals, but when we find that the smaller mammals, and other members of the animal kingdom, are likewise typically similar to their Asiatic congeners, an interesting subject for future investigation is furnished. An instance of the peculiar zoological affinities between the two continents, is furnished by the obscure genus *Urotrichus*, which had until recently been supposed to be confined to Japan. Prof. Baird, of the Smithsonian Institution, has lately discovered among a collection of objects in natural history, sent by me from Puget Sound, a specimen of this genus—differing, however, in specific character from the other.[1]

MAMMALS.—As in the other zoological forms found in this territory, the mammals present many peculiarities, distinguishing them from their Atlantic congeners, and among the lesser quadrupeds, especially the rodentia, the difference between the groups found in the three geographical sections is almost as well marked. The number of small species of rodents is remarkable, especially in the genera hesperomys, arctomys, spermophilus, geomys, sciurus and their relations.

[1] Urotrichus Gibbsii—Baird, New Species. For description of this, see forthcoming Report on Zoology, P. R. R. Reports.

Among the larger quadrupeds are bear, elk, moose, deer, mountain sheep, mountain goats (capra Americana), and antelope. Wolves are very abundant throughout the territory, and are of five or six species. The larger wolves are very formidable enemies to domestic animals, and even strong horses are killed by them in large numbers annually. This is especially the case in the Flathead country, and also in the vicinity of Walla Walla. Colts, calves, and sheep suffer very much from their depredations. Sheep have to be watched constantly with care, and folded every night. Cayotes are abundant along the line of the Columbia River—where they live principally, for lack of better food, on the dead salmon floated up on the shores. A singular disease attacked these animals in the year 1853, at the time of the smallpox epidemic among the Indians in the vicinity of Fort Okonagan. Many of the Indians dead of this disease were abandoned by their people without burial. The cayotes, having fed on this horrible food, were attacked by a malady in which the skin became covered with scabs—the body became swollen—the hair fell off, and, in the words of my informant,[1] "the skin at length became covered by one entire scab, which cracking under the sun and wind, became filled with sand, in which condition the moans and howls of the wretched creatures were most pitiful." Query—Was this transmitted smallpox, or was it simply an eruption, produced by eating and gorging such putrid food, engendered in the same manner that urticaria and other eruptions are produced in man, by errors in diet?

Foxes are numerous in the eastern and central sections, and belong to both the gray and the red species. The red foxes of Oregon, I am inclined to think, all belong to the species vulpes macrourus —Baird. (See Stansbury's *Report of Expedition to the Great Salt Lake.*) They are found in the normal *red* condition of fur, and also in the less common, but still not unfrequent, "cross" and "silver" varieties. In the western section foxes are rare; it is said, in the vicinity of Puget Sound, unknown.

Skunks are numerous throughout the whole country.

The large western gray squirrel (sciurus fosser) I have not seen in Washington Territory, although it is very common on the opposite bank of the Columbia, among the scrub-oak groves at the Dallas. I think, however, that it is highly probable that it does

[1] Angus McDowald, Esq., of the Hon. Hudson Bay Co., officer in charge of Fort Colville.

cross the river, and may be found in groves of the same oak at the eastern base of Mount Adams.

The mustelidæ are well represented, comprising weasels, marten, mink and fishers, and, probably, some new species still to be described.

The animals peculiar or confined to the geographical sections, beside the smaller and undetermined species, are here given in tabular form—with this caution in regard to error, that many species heretofore supposed identical with those of the east, may be found distinct enough to require new specific synonyms.

List of quadrupeds found, or supposed to exist in Washington Territory, with remarks concerning the distribution, &c. Those in which the specific name is left out, have yet to be compared with Eastern specimens, before the old specific names are retained. Specimens of those to which an asterisk is attached, have been forwarded to the Smithsonian Institution for study and comparison by Prof. Baird. The results will be published shortly.

Bos Americanus.	American Buffalo.	Rooky Mountain section: only stragglers from Nebraska: one killed in the fall of 1853.
Cervus.	Moose.	*Eastern section.
Cervus.	Elk.	*Eastern and western sections, abundant in the coast range.
Cervus macrourus.	Black-tailed Deer.	*Western sections and eastern spurs of Cascade Mts.
Cervus leucurus.	White-tailed Deer.	*?Western section, Pug. Sound: mouth of Columbia. (Lewis & Clark.)
Cervus Lewisii.	Long-tailed Deer.	Puget Sound.
Antelope furcifer.	Prong-horned Antelope.	Central section, not abundant.
Ursus ferox.	Grizzly Bear.	Eastern section.
Ursus ferox?	White Bear.	Townsend, doubtful.
Ursus Americanus.	Black Bear.	*Eastern and western sections.
Ursus.	Brown Bear.	Perhaps ursus cinnamomus, very large: coast range.
Taxidea labradoria.	Badger.	*Central and eastern sections.
Procyon Hernandezii.	Raccoon.	*Western section.
Canis.	Dusky Wolf.	*Canis nobilus? Western sect.
Canis.	Common Wolf.	*Canis lupus? Throughout.
Canis.	Cinereous Wolf.	Townsend.
Canis latrans.	Cayote.	Central and eastern sections.[1]
Vulpes macrourus.	Long-tailed Red Fox.	do. do.
Vulpes virginianus.	Gray Fox.	*Central.

[1] Foxes not found at all in the vicinity of Puget Sound.

Gulo Luscus.	Wolverine.	On Townsend's authority: doubtful.
Castor fiber.	Beaver.	*Throughout in timbered districts.
Tiber zibethicus.	Muskrat.	*Throughout.
Lutra marinea.	Sea Otter.	*Sea coast of west section.
Lutra Californica.	Land Otter.	*Throughout.
Mustela Americana.	Pine Marten.	*East and west sections.
Mustela.	Weasel.	*Throughout.
Mustela pennenlii.	Fisher.	*Throughout in timbered districts.
Mustela ?		*New species ? possibly a large mink: western section, the Disputed Islands, Canal d'Arro.
Putorius vison.	Mink.	*Throughout.
Mephites.	Skunk.	*There are probably two species in the territory: found throughout.
Ovis montana.	Mountain Sheep.	*Mountains of E. & W. sections.
Capra Americana.	Mountain Goat.	*Mountains of E. & W. sections: perhaps those from the different sections differ.
Felis concolor.	Congar, or Panther.	*Western and probably eastern section.
Felis Hudsonica.	Hudson's Bay Lynx.	? Doubtful, stated on Townsend's authority.
Felis fasciata.	Barroted Lynx.	*Described by Rafinesque: western section.
Lepus Townsendii.	Townsend's Hare.	*(Possibly the same as L. Campestris.) Central and eastern section.
Lepus artemisia.	Artemisia Hare.	*Central.
Lepus palustris.	March Hare.	Doubtful, stated as an inhabitant of Oregon by Townsend, probably mistaken for the next species.
Lepus Washingtonii.	New species.	*Recently described by Baird: western section, abundant.
Lepus Nuttallii.	Nuttall's little Hare.	Townsend: central section.
Lagomys princeps.	Little chief Hare.	Townsend: central section: doubtful if it is found out of Oregon.
Aplodontia lepornia.	Sewellel.	*Western section.
Arctomys ludovicianus.	Prairie Dog.	Doubtful, given on Townsend's authority.
Arctomys Franklinii.	Franklin's Marmot.	Townsend.
Arctomys Beecheyii.	Beechey's Marmot.	*? Central section.
Arctomys Douglasii.	Douglass' Marmot.	Townsend.
Arctomys flariventus.	Yellow-bellied Marmot.	Oregon Ground Hog: central section.

Arctomys Richardsonii.	Richardson's Marmot.	Townsend.
Spermophila Townsendii.	Townsend's Marmot.	Townsend.
S. Tridecemlineatus.	Hood's Marmot.	Townsend.
Geomys borealis.	Kamas Rat.	*Probably throughout.
Geomys Townsendii.	Townsend's Gopher.	*Vide* Townsend's Narrative.
Meriones.	Jumping Mouse.	Western section.
Mus leucopus.	White-footed Mouse.	Townsend.
Mus musculus.	Common house Mouse.	*Vide* Townsend's Narrative (not seen by myself).
Neotoma occidentalis.	N. S., Cooper MSS.	Western section.
Arvicola Townsendii.	Town's Meadow Mouse.	Western section.
Arvicola oregonii.	Small Meadow Mouse.	*Vide* Townsend's Narrative.
Sciurus Douglasii.	Douglas's Tree Squirrel.	*Western section.
Sciurus Richardsonii.	Richardson's Squirrel.	*Eastern section.
Sciurus fosser.	Large Western Gray do.	Central section?
Sciurus Suckleyi.	Suckley's Squirrel.	*N. S. described by Baird: Proc. Acad. Scien., Philad., April, 1855: western section.
Sciurus laniginosus.	Downy squirrel.	Perhaps found only north of the limits of the Territory.
Tamias quadrivitatus.	4 lined Ground Squirrel.	*? Central section.
Tamias Townsendii.	Townsend's Gr'd Squirrel.	Western section.
Tamias Cooperii.	*Cooper's Gr'd Squirrel.	*W. section. (Proc. Acad. Sci., Philad., April, 1855.)
Sorex Sackleyi.	New species.	*To be described: western section.
Pteromys Oregonensis.	Oregon Flying Squirrel.	Western section.
Scalops Townsendia.	Town's Shrew Mole.	*Western section.
Urotrichus Gibbsii.	New species, Baird.	*Western section.
Dipodemys.		*Central section.
Perognathus.		? Central section.
Hesperomys Austerus.	Long-tailed Field Mouse.	*Western section.
Plecotus Townsendii.	Great-eared Bat.	Western section.
Phoca.	Hair Seal.	Western, Puget Sound.
Vespertilis.		Western section.
Vespertilis?		*

Among the foregoing species are some which are given by Townsend as inhabitants of Oregon, which in his day included Washington Territory. I have added the remark "doubtful," in certain cases, when I thought the species are not found within the limits of the present territory. Townsend gives seventy species of mammals as inhabiting Oregon. I think that after all the new species recently added to its fauna by naturalists are counted, the list will amount to over ninety.

The Hudson Bay Company has for many years drawn an extensive and profitable trade in this territory, in furs and peltries. Several of the largest establishments, Forts Vancouver, Colville, and

Nisqually, are within the limits, and the amount of their trade in furs, &c., as shown by statistics, is almost incredible. The beaver has again become plentiful, being now no longer trapped to any extent, the demand for its fur having almost ceased. The principal fur trade, at present, is confined to the coarser furs and skins, with the exception of the elegant fur of the sea otter, and more recently of the mink. Bear, fox, and raccoon skins, in fact most of the *coarser* skins, are in great demand still in Europe, and are there made up into caps, ornamental dressings, &c. During the late Russian war, they were in great demand for horse-trappings, and in facings for military uniforms, on which account, the trade, instead of having been ruined by the European war, as one would at first have supposed, was really augmented.

Introduced Animals.—The Horse. This animal was most likely introduced into Oregon about 125 years ago, probably through the Shoshonees, and their relatives, the Camanches, the latter having gotten them from Mexico. There are Indians now living at the Dallas, who say that their grandfathers remembered when the horse was first brought to the Columbia River. But one or two were at first obtained, which were kept as pets, and treated as objects of great interest; they were also led, decorated with trinkets, by the savages, in their formal processions on great occasions. They subsequently became more plentiful, until, at the time of Lewis and Clarke's visit, they had become extremely abundant, and, according to the statement of those travellers, generally of a uniform color —pied or mottled horses being uncommon. The reverse of this is now the case, the mass of all being spotted and mottled in every conceivable manner. Horses now, in the interior of the two territories, are extremely abundant, many of the Indians individually owning hundreds. The Oregon Indian-horse is tough and enduring, and subsists well on the indigenous herbage of the country, even when performing long journeys. Indeed, this variety of horse is but scarcely inferior to the mule in hardiness and endurance. *Horned* cattle are abundant. The Spanish breed was introduced about 15 years ago, from California, by the Hudson's Bay Company, upon whose lands, subsequently, immense droves were raised. These at first were herded and taken care of, but afterwards, becoming widely spread over an extensive range, they became perfectly wild, and had to be hunted like buffalo. They are now almost extinct, having given place to the better breed of stock brought over from the settled States. Cattle thrive well in both territories, and, owing to the

mildness of the winters, do not require housing or foddering in the cold season. Thus, stock raising becomes a simple, easy matter to the farmer, as a great part of his ordinary care and labor in the "States," such as barn-building, and laying up fodder for winter, are spared him. Goats, asses, sheep, have all been introduced, and thrive well.

Dogs.—The native dog has become extensively amalgamated with those brought across the "plains," but one variety of any purity being found. This is the white woolly dog of the Clallam Indians, on Puget's Sound, whose hair, being clipped and spun, is woven into coarse fabrics by the natives. Imported dogs are liable to a severe distemper, produced, as is generally supposed, by eating fish, and commonly called, by the settlers, the "salmon sickness." This, it is said, attacks the dog but once. Should he be lucky enough to recover, and recoveries are rare, he is exempt for the remainder of his life from subsequent attacks.[1]

Ornithology.—In its ornithology, the Pacific coast has, as already stated, many Asiatic similarities, especially among the jays, uriæ, sandpipers, and typical falcons. Among the aquatic birds, are many novelties which afford an agreeable and remunerative study to those interested in this department. Washington Territory also frequently becomes the winter residence of Russian-American species, otherwise difficult to obtain. The ornithology of North America is so thoroughly understood, that new species, among even the smallest birds, are difficult to discover. This is markedly the case in Oregon and Washington Territories especially, owing to the zeal and labor of the learned and eccentric Nuttall, and to the industry and perseverance of his associate, the late lamented Dr. Jno. K. Townsend, of Philadelphia, and there is now but little left here, for the mere collector and seeker of new species. In illustration of this, is the fact that, out of 600 birds, containing 160 species, collected by me during three years' residence in the territory, I am in doubt whether I have obtained more than three well-marked species not hitherto described.[2]

The discovery of new species, although a very worthy object, is not by any means the sole object of a naturalist; the mere collec-

[1] This disease may, after all, notwithstanding the popular belief, be simply nothing else than the common dog-distemper aggravated by some local peculiarity.

[2] Rigid comparisons are being instituted in the Smithsonian Institution's Museum regarding this collection, the results of which will be seen in the forthcoming Report on Zoology of the P. R. R. Surveys.

tion and description of isolated and rare species, cannot compare in value to the results obtained by closely investigating the habits, peculiarities, and geographical distribution of those more common. The geographical distribution of the birds of these territories is almost as strongly marked in its peculiarities as the country itself, each section having its own families and species for the most part distinct from the others.

The same rule applies to the other zoological departments, and it would be folly to expect otherwise.

"Game" birds of many kinds abound. Of the six species of true grouse (tetraoninæ), known to exist in North America, five are denizens of Washington Territory: the only species not found there being the tetrao cupido, or prairie chicken (also called the pinnated grouse), which is replaced by its near relative, the T. phasianellus. Of the snipe family, many species are found, but the finest, both for the table or sport, the microptera Americana, or the American woodcock, is not found west of the dividing ridge of the Rocky Mountains—at least I have never seen, neither have I heard, of a single specimen, even a *straggler*, to the west of these mountains. The English, Jack, or Wilson's snipe, is tolerably abundant. Besides this, the family of scolopacius, in this territory, is well represented by the several species exclusively belonging to the Pacific coast, in addition to most of the other ordinary kinds found on the Atlantic. It is probable that more novelties will yet be found among the lesser tringæ and totani.

But one species of quail, or American partridge, is found—the ortyx plunifern (Gould). This is confined, to a limited district, in the vicinity of Fort Vancouver, and appears to have recently introduced itself from the Valley of the Willamette.[1]

The dove family, although not considered "game" birds, are still frequently eaten, and deserve passing notice. The most prominent species here, is the Columba fasciata, or band-tailed pigeon, which is abundant in the western section. In autumn, they congregate in vast numbers in wheat-stubbles, at which time they are in very good order, comparing favorably, in flesh, with the wild pigeon of the Eastern States, or any other bird of its class. The ectopistes

[1] I have heard, since writing the above, that a gentleman brought the first pair to Vancouver about six years ago, where, having remained unmolested, they have bred rapidly, so that now there are several covies of quite a respectable size found there. With a little protection at first, they will shortly overrun the country, as the winters are so mild as to be very much in their favor.

Caroliniensis, or turtle dove, is abundant throughout the territory. Another small species, which I think is undescribed, I saw in the Simcoe Valley, on the vast sage plains of that region. The passenger pigeon (ectopistes migratorius), although stated by Townsend to occur in Oregon, is rarely or never seen west of the Rocky Mountains.

Introduced Species.—Domestic poultry all thrive. Common fowls, ducks, geese, and turkeys have been introduced.

I here leave off the further consideration of the ornithology of this region for the reason, that not only an extended synopsis and history of its genera and species would be out of place and too lengthy for a paper like the present one, but it would also be premature, and an encroachment upon a report new preparing, on the Natural History of Western America, intended to accompany the Pacific R. R. Reports, by Prof. Baird, who will also give notes, &c., on the specimens I have sent him. To any one desirous of obtaining information regarding the ornithology of Washington and Oregon Territories, and more especially of all the country west of the Mississippi, I would recommend the erudite, comprehensive and beautiful work on the "Birds of California, Texas, Oregon, British and Russian America," lately brought out by Mr. John Cassin, the secretary of the Philadelphia Academy of Natural Sciences. Too much can scarcely be said of this work, as it is invaluable both to student and adept.

Ichthyology.—The fresh water fishes of Washington Territory belong to but few leading types. Of these the salmonidæ and cyprinidæ form the mass, but the subgenera and species of both, more especially of the first, are exceedingly numerous, and thus make up for want of variety in family. On the Columbia River, a large species of acipenser (sturgeon) is abundant at particular seasons, and is highly esteemed as food both by the natives and whites. But the salmonidæ form the wonder of the country, such vast shoals and variety in species as are here found, probably are not to be equalled in number by any other country on the globe. To the Indian, the salmon is a *subsistence*, in fact, his life; without salmon, he would be a poor creature indeed. To the white settler it affords a luxury and a convenience, and has even become a source of trade. Four principal genera of the salmonidæ occur, viz: salmon proper, salmon trout, brook trout and mullet (salmo malotus Pacificus, Rich'd.) The large or true salmon are found in the Columbia, of five or six different species, and in the waters of Puget Sound there are probably several more. Specifically the salmon

in these two waters appear for the most part distinct from each other.

Among the cyprinoids are the Oregon sucker, and the mylocheilus (Agassiz) which is related to the European genus leuciscus. Besides cyprinoids, there are species of the common stickle-back, and the fresh water cottus (cottopsis aspera).

The salt-water fishes are of greater variety, and embrace rays, sole, cod, flounders, dogfish, sculpins, a small species of herring, and the viviparous perch, including the new species *domalichthys vacca* of Girard. Most of these belong to new or undescribed species.

Herpetology. Batrachians.—Species of bufonidæ, hyladæ and ranidæ are found peculiar to the northwest coast. The frogs are below the size of some of the Atlantic species. Siredons I have not seen, although they probably exist.

Chelonians.—I have obtained but one species of turtle, which is, however, pretty genefally distributed. Tortoises are said to be found on the Spokane Plains.

Ophidians.—According to the catalogue of reptiles in the Museum of the Smithsonian Institution, which I may here state contains the best synopsis of North American serpents yet published, eleven species of snakes are said to be found within the limits of Oregon. These are probably all found also in Washington territory, as will be seen by the accompanying list.

Crotalus lucifer. Baird and Girard. Lozenge-spotted rattlesnake. Very abundant in the central section.
Crotalus Oregonus. Holbrook. Oregon rattlesnake. Not seen by me.
Eutainia Pickeringii. Baird and Girard. Pickering's garter snake. Very abundant on Puget Sound.
Eutainia Concinna. (Hallowell.) Rose-spotted garter snake. Very abundant throughout.
Eutainia leptocephala. Baird and Girard. Moderately abundant.
Eutainia vagrans. Baird and Girard. do. do.
Pitnophis Wilkesii. Baird and Girard. Wilkes bull snake. Abundant in the open country.
Bascanion vetustus. Found sparingly.
Contia mitis. do. do.
Lodia tenius. Rare.
Wenona (charina) var. Plumbea and Isabella. Very abundant.

To these may be added, probably, the diadophis pulchellus, or western ringnecked snake, which I have found at Fort Dallas, Oregon. A species of masticophis or coachwhip snake, also existing in Oregon, may be found hereafter within the limits of this Territory.

The venomous reptiles of Washington Territory are confined to

the genus *crotalus*, or true rattlesnake (with cranial plates replaced by scales). The most common species is the C. lucifer, which when adult is about three feet in average length, and rather thick in proportion. It is well provided with long strong hooked fangs, truly horrible in appearance. In many places it is extremely abundant, especially among the basaltic rocks, and on the dry plains along the banks of the upper Columbia. From its appearance I judge that it is equal in venom to the other species of the genus found elsewhere, which opinion is confirmed by the statements of the Indians, who all look upon the creature with dread. It is said that when bitten by rattlesnakes, the savages, giving up all hopes of life, without resorting to fruitless efforts at medicament, resign themselves to their fate, and await death in sullen despair. They say that formerly their doctors (medicine men) were powerful and able to cure the serpent bite, but that they having all died, are now succeeded by an inferior set of practitioners, who are utterly ignorant in regard to its treatment. Within the past three years two cases of rattlesnake bites have occurred to white men in the central section. Both were cured by the *heroic* administration of brandy in connection with the ordinary local treatment in such cases. In each of those cases the local and constitutional symptoms were very severe, and it is highly probable that if prompt treatment had not been resorted to, fatal results would have rapidly occurred. It is to be regretted that Prof. Brainerd's method of injecting *iodine* was not resorted to in these cases.

The second species of crotalus, C. Oregonus, was founded by Holbrook on a specimen collected by the learned naturalist, Prof. Nuttall. I have never yet been able to find this species, and suppose that if there is no mistake about the locality given, it must be confined either to the region north of the Columbia River, or else west of the Cascade Mountains in southern Oregon. In the years 1854–55, I made an extensive collection of rattlesnakes in the central section, south of the Columbia, over a strip of country 350 miles in extent, on both sides of the Blue Mountains from Fort Dallas to near Fort Hall, and was never able to obtain this singular species, although I searched diligently for it. Within the limits of *Washington Territory*, in the western section, there are *no* venomous serpents.

Saurians.—Skunks, lizards, and horned frogs (genus Phrynossoma) abound in the central section. Scarcely a species of these can be considered identical with those of the States east of the Rocky Mountains.

Entomology.—This department of the natural history is well represented, and affords the naturalists interested a fine field for investigation. Dr. Leconte, of Philadelphia, to whom the coleoptera collected by the recent government expeditions have been referred, informs me that among many fine new species of insects, he has discovered among the Oregon collections, he finds a new blistering fly, which he has named lytta cooperi. During the past year I have collected many specimens of this insect, finding them most abundant on the flowers of the yarrow plant (achillea millefolium). I regret that it did not occur to me to try its efficacy in blistering, until the season had passed by.[1]

Should the insect prove valuable for this purpose it probably can be collected in large quantities by cultivating the yarrow, its natural food.

Spiders of many kinds abound. A large species, found near Walla Walla, is said to be extremely venomous, and quite destructive to horses. As the question of the venom of spiders is still a mooted point, this statement is only made as a common opinion of the settlers in that vicinity. It *may* be that frequently deaths among horses ascribed to spider bites, are in reality caused by rattlesnakes. A small species of *scorpion* exists in abundance in the central section. Its wound is extremely painful, resembling much that produced by hornets and wasps. The hymenopterous stinging insects, such as hornets, wasps, &c., are moderately abundant, and in certain sections the yellow wasp is found somewhat annoyingly plentiful. On Puget Sound about seven distinct species of this group of insects are found. The honey bee has been introduced into Oregon, but has not yet found its way into Washington Territory. The cicadæ are tolerably represented in species, of which a kind of grasshopper is so abundant in certain seasons, as to become a scourge to the country. In the summer of 1855, they were extremely destructive to the crops on Puget Sound; and in the succeeding summer, in places, they were nearly as troublesome, destroying green crops of oats, garden vegetables, young fruit trees, and pasturage, yet to a less degree, on the whole, than during the preceding season.

The crustacea, radiata, mollusca, and annulata are well represented on Puget Sound, and the adjacent sea-coast, in families, genera, and

[1] A friend has promised to collect some of these insects for me next year, for experiments in blistering. Should they prove valuable for this purpose, I will communicate the fact to the profession at an early day.

species. Many of these afford food to the natives. The squid is considered by them a great delicacy, and sea-eggs (echini) are also much eaten. The edible bivalves embrace oysters, mussels, cockles, and clams. Among the clams there are at least five well marked species, two of which attain a large size, individuals frequently being found weighing four pounds, and I have heard of some that have reached the weight of seven pounds! *i. e.* in the shell. The Indians eat clams either fresh or dried. When dried in smoke (without salt) they keep very well, and form a staple article of food, especially during winter, with all the tribes on Puget Sound.

Owing to the great geographical diversity of this country, it affords to the naturalist a rich field for exploration and study. Of course, no one man can be expected to be equally interested in all the branches of its natural history; there is enough in each to occupy the student for a lifetime.

Although in certain *special* departments the central and Rocky Mountain regions excel in interest, the western section, on the *whole*, surpasses the others, presenting the greatest variety of interesting material. This is owing to the combination of mountain, valley, plain, lacustrine and marine species of animal and vegetable life it possesses. The thousand bays, coves, and inlets of Puget's Sound, and the ordinary indentations of the seacoast, contribute immensely to this great variety. Of the fauna of the Rocky Mountain region of this territory, but little comparatively is known, except, perhaps, concerning the larger and the fur-bearing mammals. Its ichthyology, entomology, and botany, still furnish rich fields for the enterprising naturalist, and it possesses many rare, and probably some as yet undescribed species of birds. To any gentleman of leisure, taste, and scientific ability, a trip to the Rocky Mountain region of Washington Territory I can confidently recommend, as affording a rich reward in health and enjoyment. To a lover of nature in its *wild magnificence*, no place in the known world can surpass this section. Lofty snow-peaked mountains, abrupt precipices, fertile valleys, sparkling brooks, and crystal lakes, may all in their beauty and grandeur be found here.

II. POPULATION.

The whites now number about 4200,[1] of which 3000 are regular settlers, and the remainder are troops in the service of the United

[1] This estimate is merely an approximation, no census having recently been taken.

States. In 1852 and 1853, the territory was becoming rapidly settled, induced by the profits of agriculture and the briskness of the lumber trade. Since that time, partly owing to the commercial crisis in California, and partly to the recent Indian disturbances, the population has retrograded rather than advanced.

DISEASES.—The settlers are generally healthy, and, in some cases, their constitutions seem strengthened by their change of location. In almost every case of acute disease, venesection is advantageous, and remarkably prompt in its good effects, showing a great contrast to the condition of affairs in some of the worn-out, over-populated places in the Atlantic States. The country is pre-eminently healthy, in support of which is the fact that during nearly three years' practice as medical officer at military posts on Puget Sound and at Fort Dallas, I never lost a single soldier by disease, although the garrisons' forces ranged from sixty to three hundred men during the time. In fact, I believe that my experience coincides with that of almost every medical officer who has been stationed in the country. The most prevalent diseases in the western section are rheumatic in their origin. Many persons who have previously lived in warm or dry climates are very subject to acute and chronic rheumatism after coming to this part of the territory. This is readily accounted for by the humidity of the climate, especially in winter, which here assumes the character of a "rainy season."

The only means I have at present of presenting a statement of the prevailing diseases of the settled portion of this territory is by giving in tabular form a summary of all the cases of illness treated in the Garrison Hospital at Fort Steilacoom since the establishment of the post, in 1849.

This statistical table I have prepared with a great deal of trouble from the hospital records, which contain many blunders in the retained copies of the original reports. On the whole, however, the tables here given may be relied on, the few errors still existing being unimportant in considering the whole subject in its general relations. Fort Steilacoom represents very well the general characteristics of the western section, which, as has already been stated, contains the bulk of the white population of the territory.

Table of Diseases treated in the Garrison Hospital at Fort Steilacoom, Puget Sound, W. T., during the seven years ending Sept. 30, 1856.

YEAR.	FEVERS.				DISEASES OF ORGANS CONNECTED WITH DIGESTION.											
	Feb. contin. communis.	Feb. intermit. quart.	Feb. int. tertiana.	Febris simplex.	Cholera.	Colica.	Cynanche parotidea.	Diarrhœa.	Dysenteria acuta.	Dysenteria chronica.	Gastritis.	Obstipatio.	Hepatitis chronica.	Tonsillitis.	Cholera morbus.	Gastric derangement.
1849 last qr.	..	..	4	..	..	..	..	4	4	..	..	8	..	..	..	..
1850 year	1	6	15	..	..	2	2	9	..	1	..	25	..	1	1	..
1851 "	..	1	1	..	1	2	..	4	1	..	..	2	..	3	..	..
1852 "	..	3	..	..	..	1	..	2	..	..	..	..	..	1	..	..
1853 "	..	2	2	..	..	1	..	21	8	1	1	15	..	..	..	..
1854 "	..	..	..	1	..	2	..	5	..	..	3	7	..	1	..	..
1855 "	..	4	3	..	..	..	..	6	3	..	..	5	..	..	..	..
1856 first 3 qrs.	..	5	..	..	..	2	..	19	8	1	5	7	1	2	..	17
Total	1	21	75	1	1	10	2	70	24	3	9	69	1	8	1	17

YEAR.	THE RESPIRATORY SYSTEM AND CIRCULATION.							BRAIN AND NERVOUS SYSTEM.						
	Bronchitis acuta.	Bronchitis chronica.	Catarrhus.	Hæmoptysis.	Phthisis pulm.	Pleuritis.	Palpitatio cordis.	Cephalalgia.	Delirium tremens.	Mania.	Meningitis (spinal).	Neuralgia.	Paralysis.	Nervous apoplexy.
1849 last qr.	..	..	9	..	..	1	1	7	..	..	..	2	..	..
1850 year	1	..	29	1	1	7	..	8	..	..	..	..	..	..
1851 "	3	2	8	..	..	1	..	3	..	..	..	..	1	..
1852 "	5	..	6	..	..	..	..	2	..	..	..	..	..	..
1853 "	..	..	22	..	..	..	..	6	1	..	..	..	..	..
1854 "	..	3	2	..	..	..	..	..	1	1	..	..	..	..
1855 "	..	..	8	..	..	..	..	1	4	2	..	..	..	..
1856 first 3 qrs.	..	1	42	1	2	4	1	..	4	1	1	..	..	1
Total	9	6	126	2	3	13	2	27	10	4	1	2	1	1

YEAR.	URINARY AND GENITAL ORGANS.										THE FIBROUS & MUSCULAR STRUCTURES	
	Calculus.	Gonorrhœa.	Ischuria.	Nephritis.	Orchitis.	Phymosis.	Strictura urethræ.	Syphilis primitiva.	Syphilis consecutiva.	Ulcus penis non-syph.	Rheumatismus acutus.	Rheumatismus chronicus.
1849 last qr.	..	5	..	..	1	..	..	4	..	3	..	6
1850 year	..	28	..	..	6	4	1	2	..	5	15	8
1851 "	..	17	1	1	2	..	..	4	1	1	..	10
1852 "	..	9	..	..	2	..	..	4	3	1	..	6
1853 "	..	17	1	..	..	..	..	5	..	..	..	19
1854 "	..	19	..	..	..	..	..	5	..	1	4	9
1855 "	..	4	..	..	2	..	..	23	9	2	..	10
1856 first 3 qrs.	1	17	..	..	1	..	1	12	5	..	..	42
Total	1	116	2	1	14	4	2	59	18	13	19	105

YEAR.	ABSCESS AND ULCERS.			WOUNDS AND OTHER INJURIES.										
	Phlegm. and abscess.	Ulcus.	Furunculus.	Ambustio.	Amputatio.	Contusio.	Fractura.	Punito.	Subluxatio.	Vulnus incisum.	Vulnus laceratum.	Vulnus punctum.	Vulnus sclopeticum.	Contused wounds.
1849 last qr.	1	2	..	2	..	2	..	..	..	1	1	..	..	..
1850 year	16	5	2	..	..	7	..	1	..	9	2	..	..	..
1851 "	6	5	..	1	..	5	..	..	3	3	..	..	..	..
1852 "	9	1	..	1	..	4	1	..	3	3	..	..	..	..
1853 "	22	6	3	1	..	16	..	..	12	7	2	2	..	1
1854 "	..	4	4	..	..	7	..	..	2	..	..	..	..	..
1855 "	..	1	5	..	1	6	..	..	..	2	..	..	9	..
1856 first 3 qrs.	8	7	2	1	1	21	..	..	5	9	4	..	4	1
Total	62	31	16	6	2	68	1	1	25	34	9	2	13	2

YEAR.	ALL OTHER DISEASES.																			
	Amaurosis.	Cachexia.	Debilitas.	Ebrietas.	Hemorrhoids.	Hemorolopia.	Hernia.	Morbi cutis.	Odontalgia.	Ophthalmia.	Otitis.	Pericarditis.	Feigned disease.	Abrasions.	Vermes.	Varix.	Ptyalism.	Periostitis.	Morbi varii.	Adenitis.
1849 last qr.	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
1850 year	..	8	4	..	1	..	..	..	..	4	..	..	..	..	1	..	1	..	..	1
1851 "	..	2	3	..	..	..	..	..	3	2	..	..	..	..	..	..	..	1	1	..
1852 "	..	2	1	1	1	..	2	..	..	1	..	..	..	..	..	..	..	..	2	..
1853 "	1	4	3	3	..	3	..	..	..	2	1	..	..	..	..	..	..	..	4	1
1854 "	..	..	..	3	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	2
1855 "	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	12	..
1856 first 3 qrs.	..	..	1	5	..	..	2	1	..	..	..	1	1	4	..	..	..	..	10	..
Total	1	17	13	12	2	3	4	1	3	10	2	1	1	4	1	1	1	1	30	4

YEAR.	ALL OTHER DISEASES (continued).																				
	Infl. of prostate.	Synovitis.	Herpes zoster.	Influenza.	Hæmaturia.	Debility following gross intoxication.	Functional disturbance of kidneys.	Opacity of cornea.	Nodes.	Irritable cicatrix.	Hypertrophy of heart.	Strangury.	Puronychia.	Conjunctivitis.	Fissura ani.	Venereal warts.	Pleurodynia.	Gastralgia.	Sciatica.	Scabies.	Diseases not stated in original record.
1849 last qr.	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1850 year	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1851 "	..	1	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
1852 "	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1853 "	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
1854 "	..	..	..	..	..	..	1	2	..	2	1	1	1	1	..	..	..	..	..	..	..
1855 "	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	1	5	1	..	..	..
1856 first 3 qrs.	..	..	1	..	..	..	..	..	..	..	..	..	6	2	..	1	2	..	1	2	..
Total	1	1	1	3	1	1	1	2	1	2	1	1	7	6	1	2	7	1	1	2	7

YEAR.	TOTALS.		RESULT.							
	Total.	Grand total.	Returned to duty.	Remaining.	On furlough.	Discharged from the service.	Deserted.	Died.	Average monthly strength of the garrison.	Average of total strength.
1849 last qr.	72	..	..	..	..	..	..	..	79	..
1850 year	237	..	..	..	..	..	..	..	71	..
1851 "	114	..	..	..	1	2	..	..	63	..
1852 "	78	..	..	..	..	3	..	..	35	..
1853 "	219	..	..	..	..	1	..	2	75	..
1854 "	97	..	..	..	..	1	..	..	68	..
1855 "	134	..	..	..	..	1	..	..	92	..
1856 first 3 qrs.	307	..	..	25	..	9	1	..	104	..
Total	1258	1258	1212	25	1	17	1	2	..	78[illegible]

In analyzing the foregoing tables, it will be seen that the six most prevalent diseases were catarrh, gonorrhea, chronic rheumatism, diarrhœa, constipation, and primary syphilis.

The mean strength of the garrison for that time was about 79, so that for general purposes, it may be stated, that out of a permanent force of 79 men, there were 1258 cases of sickness in the seven years, which allows on the average that each man was taken sick about 16 times during that period, or about 2¾ times in one year. This contrasts favorably with the general average throughout the whole army. According to the report of the Surgeon-General, Nov. 16, 1855, for the year ending June 30, 1855, each man throughout the army had been taken sick three and one-fourth times.

In the large number thus reported taken sick, care must be taken not to indulge the idea that these tables show a large amount of *real* sickness. A very slight ailment is sufficient for a soldier to present himself to the surgeon's notice, for excuse from duty, and as a consequence should he be excused, the entrance of his case on the hospital record follows. A slight wound on a finger, as it would interfere with the proper performance of certain duties in drill, or musket practice, entitles the soldier to be placed on the sick list. In the same manner, a slight catarrh, diarrhœa, or rheumatic pain, might prevent a man from standing guard at night. He is, therefore, reported sick, although the symptoms may be so slight as would scarcely be thought of by a man in ordinary business. To this fact may be ascribed the light mortality in the army, even the slightest indispositions being immediately attended to, so that much serious disease, in which they might ordinarily result, is avoided, on the principle of the old adage, "a stitch in time," &c. &c.

Two or three days' confinement in hospital, in ordinary cases, is sufficient; the man is returned to "duty," in all probability to be again reported sick with some other slight ailment before the expiration of a month.

In this way the statistics swell to a formidable appearance in the course of a year, and under the headings of "incised wounds," "chronic rheumatism," "diarrhœa," "constipation," &c. &c., a fearful array of illness appears to exist.

In addition to these cases of real disease—however trivial—there are frequently cases of the most obstinate and artistic malingering. Indeed the expression, "Playing the old soldier," has passed into a

proverb. Thus, in order to obtain discharges from the service, almost every disease is at one time or another feigned. Some "old soldiers" habitually and periodically report themselves sick, for no other reason than that it is about the customary time of the year for them to do so. Since the increase of pay allowed soldiers, by act of Congress, in 1854, diseases feigned for the procurement of discharge, are not nearly so common as formerly. In many cases diseases are feigned so *artfully* that it is almost impossible to *detect* the imposition, although it may be *suspected* by the medical officer. Among the most difficult of detection, are neuralgias, chronic rheumatisms, and cephalalgia. Again, a man of bad character will sometimes report, that during the night before, he was seized with a chill, which gradually passing off, left him with a severe headache, and a feeling of great nausea and debility. From previous excesses, the man's appearance, the condition of his tongue, &c., may seem to corroborate his statement. What is the medical officer to do? Shall he force the man to continue at duty, in the wet, or as sentinel in the night time? Rather than incur the risk of injustice, most surgeons would excuse the man from duty, and thereby, through their humanity and kindness, add one more case to the list, in which they have been grossly "humbugged." Although the medical officer may suspect that the complaint is a fabrication (the furred tongue, &c., being only accidental in the case), he generally reports the man to the commanding officer as *sick*, and upon the hospital records the case is entered, according to the caprice of the surgeon, going to swell the columns of "obstipatio," "cephalalgia," "gastritis," "febris simplex," or "gastric derangement."

Some diseases being external, or such as can be discovered by auscultation, are unmistakable, and consequently can always be entered under their appropriate headings, less latitude being given to caprice in choice of names.

According to the tables just given, there have been but two fatal cases out of 1258 taken sick in seven years. Both these cases were the effects of long continued gross intoxication. Thus, it might be supposed, that if the two men who thus died had been *temperate*, there would not have been a single case of death during the period specified. Certainly all this speaks highly in favor of the salubrity of the Puget Sound region.

One case of death is not reported on the foregoing tables. This was that of an officer who died by suicide from laudanum.

The intermittent fevers were almost, if not quite, all brought from a distance. According to the dates given in the original records, almost all such cases occurred immediately after the arrival of fresh troops; some from Fort Vancouver, some from California posts, and others again who had just passed over the pestiferous Isthmus of Panama. After a short residence at Fort Steilacoom, the miasmatic disease invariably disappears.

Acute dysentery appears to have been prevalent in certain years, especially in 1853, and the third quarter of 1856. The cases during the past year were mild, and yielded readily to treatment.

In 1856, we find recorded seventeen cases of *gastric derangement.* These were cases of slight gastritis, accompanied by constipation and other disagreeable symptoms, generally occurring to the men after debauches.

Five cases of phthisis pulmonalis are recorded. These are uncommon in the army, owing to the rigid physical examination to which recruits are subjected.

Of the 116 cases of gonorrhœa, 14 were followed by orchitis. Frequently this latter disease appears to be induced by the soldiers themselves, in endeavoring to cure themselves of the first mentioned complaint, by forcing down over-doses of copaiba, and occasionally by using powerful injections.

To 59 cases of primary syphilis, there were eighteen cases of consecutive disease. A caution, however, is necessary in looking over tables of military statistics of this character, and in making comparisons of the data afforded; because frequently the same man may be readmitted and treated for the same disease, a second and even a third or fourth time; requiring, of course, a re-entry of his case on the hospital books upon each occasion. Thus, a man re-admitted, say four times, to be treated for gonorrhœa, will cause a *new entry* four times, so that in figuring up the statistics, one case of the disease will appear as five cases.

I regret that the printed formulæ, in the Army Hospital-Case Books contain such vague terms as "morbi cutis," "morbi varii," "eruptio," &c., as they certainly impair the value of the statistics.

The spring and summer of 1856 were remarkably wet. In the spring, among the settlers on Puget Sound, there were a number of cases of typhus fever, mild, however, in character. During the summer, many rheumatic cases presented themselves to my notice, and as the season advanced, dysentery, as already stated, made its

appearance. All these, however, yielded readily to treatment. Cases of accident generally did well, and operations resulted favorably.

Ophthalmia, generally gonorrhœal in its origin, occurs occasionally in the territory, but is not, I think, as severe as the same disease in the Atlantic States. Venereal diseases are very common throughout the territory. Secondary cases, having *rheumatic* tendencies, are very apt to be tedious.

In the rest of the settled portions of the western section of Washington Territory, the recorded observations at the two points, Fort Vancouver and Astoria, present the best data for drawing conclusions as to the prevalent diseases. Concerning the medical topography of Astoria, I refer those interested to the able report published by Israel Moses, M. D., late assistant surgeon United States army, in the number of January, 1855, of the *American Journal of Med. Sciences*, second series, No. lvii.

The special statistical record of diseases at Fort Vancouver, W. T., I have been unable to obtain in time for use in the present paper. It will be found, however, to differ from that of Fort Steilacoom and of Astoria, in the prevalence of miasmatic diseases. These are generally mild cases of quotidian and tertian intermittent fevers; owing to the fact that Fort Vancouver is situated in the midst of a small miasmatic district, the only one of the kind in the territory —a continuation of the miasmatic tract which traverses the Willamette Valley, of Oregon.[1]

III. NATIVE POPULATION.

The aboriginal natives of Washington Territory number between twenty and twenty-five thousand, and are divided into a great number of small tribes, speaking at least twenty-one languages and dialects unintelligible to each other, and into a still greater number of sub-tribes, speaking separate dialects, and governed by different heads. In many important characters and habits, they all resemble each other, each being, however, somewhat modified by certain local peculiarities in position and mode of life. Those on the salt water almost *live* in their canoes, subsisting principally on fish. They are shorter than their inland neighbors, and, on account of their indisposition to walk much, are remarkable for the smallness of their

[1] Much of the prevalence of these diseases at Fort Vancouver is owing to the annual June freshet of the Columbia, which, subsiding during the hot months, is generally followed by malarious fevers.

lower limbs. Their arms and chests, on the contrary, are finely developed, a result of their habit of using paddles. They almost all have flat heads, the exceptions being in the cases of slaves, flat heads being a mark of aristocracy, or at least of freedom. A few of the children recently born have escaped this unnatural practice, through the advice and influence of the whites with their parents. The process of head-flattening has been so often described that I shall not here undertake to give it. The results of what to us appears a horrid and unnatural deformity, are singularly without manifest evil. Idiocy and insanity, although occasionally met with, are comparatively rare, and I have never seen a case of *extensive* paralysis which I could attribute to this cause. The most common apparent symptom of cerebral injury, is the frequent occurrence of strabismus. Headaches, too, are not infrequent. As to mental capacity, *I* think, and I believe that most of the intelligent white settlers concur with me in the opinion, that the individuals and tribes with *flat* heads equal, if they do not excel, those of the interior, where this practice does not exist. They are loquacious and imaginative, quick at comprehending, and, unlike the rest of our native American Indians, are fond of acquiring other languages. Cases of individual bravery are more rare with these than among the Indians of the mountains. Their legends and traditions are exceedingly numerous, and their mythology very complicated. Extensive researches concerning these matters are now being made by George Gibbs, Esq., especially in relation to their bearing upon the peculiarities of the mental composition and general construction of ideas of the red man of America.

Their religion, and the treatment of the sick by incantation, come under the head of the Chinook Jargon word *ta-man-wis*, and have reference to a sort of spiritual order of beings, from which they suppose good and evil emanate. Anything in health or sickness operating by means of its charm or secret influence is called *ta-man-wis*, and, in fact, everything that cannot be understood by them is ascribed to the same agency. At their dances and feasts, mesmerism is not unfrequently practised, and Mr. Gibbs informs me that the charming of sticks and poles, in the manner of our own table turning, is well understood by a few.

Their medical treatment in disease is principally by this ta-man-wis, and in insanity[1] this is their "sheet anchor." In internal in-

[1] Intermarriage of blood relations among these Indians is of extremely rare occurrence; indeed, they say themselves that they *never* intermarry, and appear to

flammatory complaints, a number of old women endeavor, by sucking different parts of the body of the patient, to draw out the evil spirit. This frequently has good effect, as I have known in a severe case of pleurisy, where the extensive sucking appeared to give the same benefit that we obtain by "dry cupping." Their materia medica is principally botanic. Among the indigenous plants, the Indians are acquainted with many good cathartics, emetics, diuretics, and even emmenagogues. In suppression of the "lochial discharge," they have great faith in the application of a flat stone, heated as hot as it can be borne and applied to the abdomen over the uterus. Vapor baths are in common use, more especially in the interior and on the Columbia River, where, near every watercourse, "sweat-houses" may be seen.

Abortion is commonly practised, violence and internal remedies being both resorted to. The Indians of the interior place great confidence in the use of the tail of the rattlesnake for this purpose. The dose is two rattles, pulverized and taken in a little water. This practice I found common even among the far distant tribes of Nebraska, the Blackfeet and Grosventres (a branch of the Arrapahoes). From the implicit reliance in the efficacy of the rattles of the rattlesnake in producing uterine contractions, which exists in the minds of so many different tribes, spread out over such a vast extent of country, I am inclined to think that there may be some virtue in the article, and have accordingly procured a number of rattles for experiments, the results of which I will hereafter make known.

Venereal diseases are very common, the sad results of which are daily becoming more and more apparent. I am inclined to think they were unknown until about sixty-five years ago.[1] As no effectual treatment for this disease is employed by the Indians, it seems to me, had it existed prior to the time I specify, that, owing to bad or ineffectual treatment, their filth, and their habits of promiscuous intercourse, the whole race would have been exterminated on the Pacific coast years and years ago.

Intemperance is now doing its work rapidly. Alcohol, with

have religious scruples against the practice. This may account for the rarity of insanity among them. Insanity, although occasionally found, is by no means common, excepting, of course, the ordinary delirium in fevers, &c.

[1] In support of this opinion, vide Moses' *Medical Topography of Astoria*, already alluded to.

syphilis, will soon complete the work of the destroyer, and the Red man, in this territory too, will be extinct.

Much interesting material might be embodied in this report concerning the additional causes of the rapid disappearance of this race, but I am anxious to avoid greater length in the present paper. Suffice it to say that, in addition to the above, I consider the *partial* adoption of the white man's mode of life a very prolific source of disease. Civilized clothing, I think, is especially injurious. An Indian rarely thinks of washing his shirt, and the greater the number of his superincumbent coats and other habiliments, the more seriously is he exposed to the deleterious effects of the confined and stagnated exhalations of his own body. Formerly, when merely the blanket or a skin robe was worn loosely over the shoulders, air had free access to every portion of the body. These "air-baths" undoubtedly had a good effect, and were probably the principal antidotes to the accustomed uncleanliness.

It is true that the Indians of this region are fond of bathing and washing their own bodies, but the fact that immediately afterward, shirts, coat, vest, &c., are put on, which have been worn constantly for months without washing, does away greatly with the utility of the baths, and, I am convinced, become a prolific source of disease. The old in the settled districts are now scarce, and the young short-lived. In the interior, on the contrary, where civilized clothing is more scarce, and the habits of individuals more like those of their ancestors, longevity and robust health are general.

Throughout the country, phthisis pulmonalis appears to be the most common non-specific disease with the aborigines. Irregular habits, exposure occasionally to famine and to cold, especially while sleeping, seem to be the principal causes of this in the far interior, and in the mountains. This, I think, is aggravated by the general habit of smoking the dried leaves of the Arbutus uva ursi—smoking it by *inhalation*, in the Indian fashion.

On the coast and in the settled districts, although hardships and scarcity of food do not exist in any proportion to what is encountered in the interior, yet the same disease is even more common, the unfortunate result of the bad habits, &c., already alluded to, attendant upon their intercourse with the whites.

Smallpox, and probably the occasional visits of epidemics of the other contagious exanthemata, have also had much to do with their depopulation. It would appear, according to Vancouver, who visited Puget Sound in 1792, that the smallpox raged among the

tribes on the Sound about the same time that Lewis and Clark calculated that it raged on the Columbia River, *i. e.* about the year 1783.

Strumous diseases are very common, and are rapidly increasing. The most common of these (besides phthisis pulmonalis) are caries of the spine, morbus coxarius, and glandular ulcerations.

Attempts at civilization meet with but partial success. To Christianize—destroy their old systems of tamanwis and mythology, and instil the proper education, we must stop the migratory habits of this people, and fix their residences permanently. But here lies the difficulty. Their habits are too uncleanly to admit of a long residence in one building, or even in one camp, so that to escape the sickness attendant upon such a mode of life, they quickly fly from their confined abodes, to their old and well loved hunting and fishing grounds, changing their residences from place to place according to the migrations of game, the ripening of different kinds of berries, or the arrival of various species of salmon. Upon reservations where they have been pent up, and fed upon partial rations of civilized food, in addition to their ordinary diet, it is sad indeed, to contemplate the increase of diseases, and the dejection and unhappiness produced, not only from this cause, but by the continual intestine squabbles and wrangling disputes always existing among themselves—the necessary result of so many ignorant, selfish human beings, being thus herded together.

HALF-BREEDS.—The hybrid of the red and white man appears to be stronger, and to hold a better physical position than that of the white and negro. It is also less apt to be sterile. For proof of this, I refer to the nation of half-breeds now living on the Red River of the North, and also to the Mexican population. Those in Oregon and Washington Territories have existed scarcely long enough to show what the proportion of sterility is.[1] In fact quarter-breeds, or half-breeds of the second generation, are yet very rare in the territories. The half-breeds of the first generation are very apt to be strumous, and generally die early of phthisis. There may be, however, other causes for this, as for example the irregularities and

[1] The only instance in this territory in which I am personally acquainted with the parties, where two half-breeds have intermarried and have had children, of the resulting progeny, one child has a congenital deformity of the wrist, and another is deaf and dumb.

depraved constitution frequently of the parents. As a class, the half-breeds make a poor population, with, perhaps, the honorable exception of the educated children of the officers of the Hudson's Bay Company. The women are generally loose and immoral, and the men a set of worthless vagabonds, who as horse-jockeys and gamblers appear to reach the summit of their ambition—a poor, degraded, drunken, good-for-nothing race.

CONCLUDING REMARKS.—In the foregoing pages, I have occasionally been obliged to introduce seemingly irrelevant matter. This has been frequently unavoidable, nearly everything stated being required, collaterally, for a true exposition of the condition of the territory, medically and otherwise. On the whole, Washington Territory presents many inducements to the new settler, at least in the western section. The central section is at present the seat of a bloody Indian war, which will probably continue for some years. This section, however, possesses but few advantages for settlement, and, in my opinion, but little would be lost if it remained unsettled for a long time, providing, however, that good emigrant routes might pass through it, on which emigrants could travel in safety to and from the western section. The Rocky Mountain section is at present so remote, bounded, as it is, on the east by those vast regions of desolation, the "Mauvaises Terres," and (with the exception of a narrow strip of land, variable in width, between the mountains and Snake River) on the west by the central region, the advantages of which are but little greater than those of the "Mauvaises Terres," with the additional discomforts of an extensive Indian war, the idea of present population is out of the question.

The western section of the territory is now the only portion of pressing importance. In it lies the great and wonderful Puget Sound, which, with its fine harbor, healthy, moderate climate, abundance of wood, water, and arable land, its freedom from malaria, its fish, its game, and its magnificent scenery, render the vicinity a very attractive, pleasant region for settlement; a region, too, which is sure, in future times, to take a high position in the eyes of the world.

GEO. SUCKLEY,
Asst. Surgeon, U. S. A.

FORT STEILACOOM, W. T., *Oct. 1st*, 1856.

REPORT

ON THE

MEDICAL FLORA OF WASHINGTON TERRITORY.

BY

J. G. COOPER, M.D.

1857.

REPORT ON THE MEDICAL FLORA OF WASHINGTON TERRITORY.

HAVING been appointed by the Association at its meeting of 1856 "A special Committee, to report upon the Flora of Oregon and Washington Territories," I have the honor to submit the few remarks following upon that subject.

Conceiving that the object of the report should be principally to give some information on the medical flora of those territories, I have now limited myself to a selection of such species as appear worthy of trial, either as substitutes for useful medicines, or for supposed valuable properties of their own. Full lists of the vegetable productions of those countries would be of but little interest to the profession generally, and would swell the report beyond reasonable bounds. I collected myself about 500 species of plants in Washington Territory alone, and in both territories there are probably to be found three times that number. Of these, not more than 800 are found on each side of the continent, though the range of almost every species differs from all the others. It will be perceived, however, by the botanist, and even by the more careless observer, that there is a large series of plants which are (what are now called "representative species," that is, species closely resembling plants of other parts of the world, but presenting constant and marked differences) sufficient to indicate that they sprung from a distinct origin. This fact of "representation" of natural forms is not confined to plants, but is, perhaps, even more distinctly observed in the higher classes of created beings, and is beginning to form a very important part of the study of natural history, especially in relation to the theories upon the centres of creation, and the distinct origin of similar forms of life.

It is no less interesting to the pharmaceutist and to the physician,

for, as a general fact, it is found that the closer the external resemblance in species, the more similar is their medicinal virtue, and *vice versâ*.

Many instances of the use of such closely allied plants in place of each other might be adduced, and will occur to all acquainted with the botany of our country. As instances, I will mention the substitution of cassia Marilandica for the senna of Africa and Asia, the produce of several nearly allied plants, and of the bark of our oaks for those of Europe.

We have besides a large number of plants much less closely allied, but still possessing similar properties. This resemblance sometimes extends through all the members of one genus, as for instance, ranunculus, sometimes throughout the more comprehensive groups of sub-orders, orders, and even further, including several orders, more or less similar externally, in a group having similar medical properties. As these facts are fully discussed in works on medical botany, I will not now take up the time of the Association by considering them.

But it is equally well known that species, very closely allied, though not, perhaps, strictly representative of each other, have very different medical properties, and also that the same plant varies in this respect under different circumstances of soil, climate, and its state of nature or cultivation.

I may here remark that most of the plants considered as identical on our two coasts, vary considerably in appearance, some even presenting greater differences than certain plants generally admitted as distinct species; but in these cases the rule by which botanists are guided is the occurrence of intermediate forms in the middle parts of the continent, which so gradually combine the two extremes that they may be rationally considered to have sprung from one origin, and to have become altered in growth by external influences. I have alluded to instances of this in conium maculatum and artemisia vulgaris, plants distributed throughout the northern temperate zone.

We cannot, then, in any instance take it for granted without trial that one plant can be substituted for another in medicine because it resembles it, however closely; but we may derive important assistance in conducting our trials of a new plant from a knowledge that it is a variety, a representative, an allied species, or even that it is more distantly connected, so as to be included in the

same natural order. Thus, while there would be much hesitation in substituting *Megarhiza Oregona* for others of the violent cathartics derived from the order cucurbitaceæ, if we knew nothing positively concerning its properties, we should not fear to try the root of *Sidalcea malvæflora* as a demulcent from its belonging to a harmless order of plants, and being nearly allied to the well-known mallow, althea, etc. Our uncertainty would almost entirely disappear in the case of *Geranium albiflorum*, *Rhus diversiloba*, and others, which so nearly resemble their eastern representatives that they might be considered merely varieties did we not find their distinctive characters always well defined and without intermediate forms.

Further explorations and collections are continually altering the botanical knowledge we have of our western countries, and it becomes necessary to unite or to separate supposed species according to the indications afforded by these means, so that several of those which I have given as distinct may in time be found to be only varieties of the eastern plants.

My residence and collections having been altogether in Washington Territory, this report applies to Oregon only so far as the plants mentioned are found there also, which is doubtless the case with all of them.

The amount of actual knowledge of the properties of plants found in Washington Territory may seem small compared with what ought to have been collected during a residence there of more than two years. But I hope that a few remarks upon the subject may show how slow must be the accumulation of such knowledge.

First. Of the Indians, from whom much might be expected, I learned little, though I made frequent inquiries of them directly and through the white settlers. As may be more particularly ascertained through works on their habits, &c., they rely almost entirely on superstitious rites and incantations for the cure of disease. These, with the use of the steam bath, often followed by a plunge in the cold water, are their chief reliance in all cases.

The inadequacy of their medical knowledge is further shown by the eagerness with which they seek assistance from the white physician, while their superstitious ideas of the power possessed by him make them believe that he can cure or kill at pleasure, and, by their law of retaliation, he is often subjected to the risk of being killed if he loses his patient. This was the fate of the mis-

sionary Dr. Whitman, and I have heard of several other instances of its being attempted.

It is somewhat interesting to find that they are acquainted with the use of the actual cautery as a counter-irritant, and they also use it to show their courage. In an Indian who had hemiplegia from a blow on the back of the neck, I wished to use this means of cure, but, though he had formerly made several issues on his legs to remedy pain in the bones, I could not make him understand the value of the application to his neck, nor persuade him to have it tried.

I had, indeed, the impression that many of the "medicine men" knew a good deal which they would not disclose, either from the wish to keep their arts secret or in hopes of obtaining exorbitant prices for their knowledge.

The second source of information would naturally be the white settlers, and it was from them, in fact, that I obtained most of the items as to the use of plants in medicine. But their experience was of course limited, and though I inquired of several physicians and others long resident in the country, I found that they could obtain as little knowledge of the subject from the Indians as I could.

The third and most valuable means of trying the properties of plants, that of direct experiment, was almost entirely closed to me. The country is justly celebrated for healthiness, and in the whole course of my residence there, I had no illness except a slight attack of influenza, though exposed to the changes of the weather, as I had never been before, and for a long time daily wetting my feet in the salt water.

And among the few cases I had to attend I thought it my duty to use such medicines as I knew the effects of instead of those whose properties were almost unknown.

The arrangement I have adopted is that of the Flora of North America, by Professors Torrey and Gray, and of most of the modern books on botany which use what is called the natural system. The advantage of this arrangement is to give those physicians on the western coast, who may wish to try the remedies, the best means of finding descriptions of the plants referred to.

The principal advantage I hope for in offering these few notes on the subject, is to call the attention of those who have the means of obtaining and trying them, to the number and variety of medicinal agents they have about them, which may become important

as substitutes for the remedies now imported on the western coast, at great expense, from all other parts of the world, while there is not, as yet, any supply derived from its own resources, as there is with us. And among the many practitioners resident there, who have had better opportunities for observation, there is doubtless a large fund of information which, if collected, would give to those countries quite a large materia medica of their own.

Classing the substances according to their effects, it will be observed that, in this list of about fifty plants, we have almost all the principal classes of remedies. In the present state of our knowledge of their properties, it is impossible to arrange them strictly in this manner, especially as many combine several of those properties on which the classes are founded, and in most cases, they no doubt resemble the analogous species for which they may be substituted. Sufficient is indicated in the article on each, to show that, even without the aid of foreign drugs, the physician might fulfil all the principal curative means by which we now combat disease, simply by assisting the all powerful "vis medicatrix naturæ."

RANUNCULUS.

Flora of N. A., i. p. 15.

I met with six species of this abundant genus of plants in Washington Territory, all but two distinct from those common in the Atlantic States.

As far as known, however, all the species have similar medical properties, and, no doubt, those of the western coast might be often used with advantage.

Dr. Wood remarks (*U. S. Disp.*, 1854) that "the plant has been very properly retained, as occasions may occur when the practitioner in the country may find advantage in having recourse to its powerful rubefacient and epispastic properties."

R. occidentalis and *R. orthorhynchus* are both common in prairies, and most nearly resemble the officinal *R. bulbosus*—crowfoot, buttercups.[1]

[1] Among external irritants, I may here mention that I discovered, east of the Cascade Mountains, a new species of blistering-fly (*Lytta Cooperi, Le Conte*, Proc. Acad. Nat. Sciences, of Philad., Feb., 1854), distinguished by a reddish head and thorax, black abdomen, elytra reticulated, etc., length nearly an inch. It doubtless possesses the vesicating properties of the tribe *Cantharideæ*, and may be found in the end of summer on low bushes.

DELPHINIUM.

Flora of N. A., i. p. 30.

Two species of this powerfully acrid tribe of plants are met with in Washington Territory. The *D. azureum* nearly resembles the *D. consolida* of the *U. S. Disp.*, and no doubt might be substituted for it, especially as an external application in scabies and pediculi, common pests of the country. *D. Menziesii* is less common and more resembles *D. staphisagria* in appearance, from which the violent poison delphinia is obtained; employed in neuralgia, rheumatism, and paralysis, externally.

ACONITUM COLUMBIANUM.

Nuttall. Fl. of N. A., i. p. 34.

According to Dr. Wood, eight or ten species of aconite of the Eastern Continent and one of the Alleghanies have nearly similar properties. It is, therefore, probable that the beautiful species of the western mountains, which closely resembles the officinal *A. Napellus*, has similar virtues.

PÆONIA BROWNII.

Dougl. Fl. of N. A., i. p. 41.

This native species of pæony, found on the higher parts of the mountains, I was told is used by the Indians "to give their horses long wind." The root is the part used, but what is its mode of administration or immediate effects I had no means of observing. I sent seeds to Washington which, if cultivated, may give us the opportunity of experimenting. The seeds of the P. officinalis of gardens are said to be antispasmodic.

BERBERIS (MAHONIA) AQUIFOLIUM.

The holly-leaved barberry, now often cultivated, is very different in appearance from the officinal plant, and from its representative in the Eastern States. Its medical properties also seem to differ. Its blue berries are emetic and cathartic when fresh, but are used much for preserves under the name of "Oregon grape." The root is used by the Indians to dye yellow.

CARDAMINE ANGULATA.

Hooker. Fl. of N. A., i. p. 84.

This cress possesses the pleasant flavor of the garden species, and, though without probably any active properties, I mention it

here as an illustration of the numerous family of Cruciferæ, all of which have rubefacient properties, more or less, like those of mustard and cabbage leaves, and several having also been used with great advantage in sea scurvy, in which they may, from containing a little sulphur, be more beneficial than other vegetables. As representatives of the family are found in nearly all coasts, and are all harmless, their use by seamen might often prevent that dreadful disease. Numerous species are found in Washington Territory.

GERANIUM ALBIFLORUM.

Hkr. Fl. of N. A., i. p. 206.

This species, which is strictly the representative of the common species so much used in the Atlantic States, possesses, no doubt, the same astringent properties. It is abundant near Vancouver, but I did not meet with it northward. Another species, the G. incisum, grows towards the Rocky Mountains, and more nearly resembles the officinal crane's-bill.

OXALIS OREGONA.

Nutt. Fl. of N. A., i. p. 211.

This species of wood-sorrel abounds in the forests along the lower Columbia, and, like the other species, the rumex acetosella, or sheep-sorrel, and many other plants, contains a large amount of oxalic acid, probably in the form of binoxalate of potash, or salt of sorrel. It is used for salads and pies, and probably without bad effects, in moderate quantities. Its medical properties must be similar to those of O. acetosella, as described in Appendix to *United States Dispensatory*.

RHUS DIVERSILOBA.

Torr. and Gr. Fl. of N. A., i. p. 219.

This species of poison vine resembles much the R. toxicodendron of the U. S. P., both in appearance and poisonous properties. It abounds in the open plains of the interior, and is rarely seen near the coast. I suffered severely from its effects, while encamped on the Takima River, in 1853, as did others of the party. The eruption was, however, more dry than I have had from the eastern plant, consisting almost entirely of swelling, redness, and burning heat, which lasted for several days. Whether the absence of herpetic vesicles was due to the nature of the poison, or other circumstances, is uncertain.

I heard that in California a "night-shade" was used as a local application for the relief of this, but could not learn the exact species. From the anodyne effects of some solanums, it may have been one of that genus, perhaps S. nigrum, but not S. dulcamara, which does not grow wild on that coast. The medical properties of the western, must be similar to those of the well-known Atlantic plants.

SIDALCEA MALVÆFLORA.

D. C. Flora of N. A., i. p. 234.

This beautiful representative of the mallow family grows in wet soil, from the Rocky Mountains to the coast, much more luxuriantly in the marshes, where it becomes six feet high. It possesses the pleasant demulcent mucilage of the marshmallow and others, for which its root might be substituted. Malva borealis, Malvastrum coccineum, and other plants of this family, grow in the territory.

RHAMNUS PURSHIANUS.

D. C. Fl. of N. A., i. p. 262.

The western buckthorn has properties similar to those of the officinal R. catharticus. The berries are unpleasant, and not eaten by the Indians, but are greedily eaten by bears, whence the tree has obtained the trivial name of "bear-berry," or "bear-wood." The former appellation is evidently very improper, as two other very distinct plants are confounded under that name in the territory. This plant has been recently separated from the genus Rhamnus by Prof. Gray, and, with other species, now belongs to Frangula, standing as F. Purshiana in my list.

GLYCYRRHIZA LEPIDOTA.

Nuttall. Fl. of N. A., i. p. 298.

One, and perhaps two, species of liquorice grow on the plains near the Rocky Mountains, which are said, by Nuttall, to have the taste of the officinal root. I collected seeds, which I took to be of this plant, in 1853, near Snake River.

CERASUS MOLLIS.

Douglass. Fl. of N. A., i. p. 410.

This and two other species of cherry are found in the territory, and all contain some of the bitter principle, and the hydrocyanic acid, which make so valuable the bark commonly called Prunus Vir-

giniana, but more properly the bark of Cerasus serotina. The above species is, however, more nearly allied to the garden cherry, and probably differs in some degree in properties from our wild cherry. *C. demissa*, Nut., mostly found east of Cascade Mountains, is a shrub, more nearly allied to the latter species.

NUTTALLIA CERASIFORMIS.

Torrey and Gray. Fl. of N. A., i. p. 412.

This shrub, entirely unlike anything in the Eastern States, has the flavor of bitter almonds much more strongly in every part than the cherry. The fruit, however, though bitter, is eaten by birds, and cannot, therefore, be poisonous.

RUBUS MACROPETALUS.

Dougl. Fl. of N. A., i. p. 457.

This blackberry much resembles the officinal R. trivialis, and the root no doubt possesses a similar astringency, possessed in some degree by all the species of this genus, as well as others of the family, especially geum and potentilla. The many species of these genera found in the territory are worthy of trial, to ascertain their relative values.

MEGARHIZA OREGONA.

Torr. and Gray. Fl. of N. A., i. p. 542.

The "giant root," of Oregon, is worthy of particular trial as a medicine. The root, which grows as large as a flour barrel, is used by the Indians as a purgative, and is said to possess powerful properties similar to those of colocynth, elaterium, and other plants of the same family. Mr. F. Panton, a druggist, formerly of New York, informed me that he had made use of the intense bitterness of the root in making "Stoughton's Bitters," without any bad effects, from which it would seem to be changed in properties by boiling. It is the Sicyos Oregonus of the *Flora of N. A.*, and, in growth of the vine, much resembles the common Wild Cucumber, S. angulatus.

OPUNTIA MISSOURIENSIS.

D. C. Fl. of N. A., i. p. 555.

This prickly pear much resembles the common eastern species. The leaves or joints contain a great deal of harmless mucilage,

which the noted mountaineer Col. Bonneville, U. S. A., informed me was used to clarify the muddy water only to be found on some portions of the western plains. This was done by scorching off the thorns and then cutting up the joints in water, through which the mucilage soon diffused itself, and gradually settled with the impurities.

CONIUM MACULATUM.

Linn. Fl. of N. A., i. p. 640, and U. S. Disp., p. 280.

This powerful plant grows abundantly on the western coast, and so much larger than here as to appear a different species. It is, however, considered only a variety. It would be interesting to ascertain whether its properties are the same under a very different climate, which seems to affect its growth so much.

HERACLEUM LANATUM.

Michx. Fl. of N. A., i. p. 632.

The masterwort, sometimes used, but considered by Bigelow as dangerous, grows commonly along the western coast. It is described in the *U. S. Disp.*

CONIOSELINUM FISCHERI.

Wimm and Grab. Fl. of N. A., i. p. 619.

GLYCOSMA OCCIDENTALIS.

Nutt. Idem., i. p. 639.

These plants have a pleasant aromatic odor like anise, and, like the other fragrant umbelliferæ, are probably harmless.

Many other plants of this family grow in the territory, all distinguished by odors more or less pleasant, but their medical properties are unknown. Plants containing so many poisonous species are dangerous to experiment with. One which I supposed in its dry state to be the root of a Pencedanum is used by the Indians of the interior as an emetic. The young shoots of the Œnanthe sarmentosa (Nutt.) are eaten by the Indians in spring, and taste like celery. The tuberous roots of the Edosmia Gairdneri (Hooker) are also eaten, according to Dr. Suckley, Surgeon U. S. A.

ECHINOPANAX HORRIDUM.

SMITH.

PANAX HORRIDUM.

SM. Fl. of N. A., i. p. 648.

This remarkable plant, allied to the famous ginseng, and to the aralias of the Atlantic States, seems to possess some medical properties, as its thorns make a very irritating puncture; but I could not learn, on inquiring of the Indians, that they ever used it. It is sometimes called "Devil's Walking Stick," as is *Aralia spinosa*, which it resembles in its thorny stems, though very different in its leaves.

CORNUS NUTTALLI.

AUDUBON. Fl. of N. A., i. p. 652.

The western dogwood so much resembles the C. Florida that there can scarcely be any difference in its medicinal properties. It grows, however, much larger, and is larger in all its proportions, a fact noticeable in almost all the identical or closely allied plants of that coast. Should their strength be correspondingly increased, it will be an interesting fact in materia medica. Several other species of cornus, found in Washington Territory, have all more or less of the bitter principle, and the bark of one, the C. sericea, is used by the Indians near the Rocky Mountains to mix with their tobacco, probably more to make it last longer than for any agreeable qualities in the bark. It is called by them "kinni kinnik," a name also applied to the leaves of arctostaphylos uva ursi, used for the same purpose.

SAMBUCUS GLAUCA.

NUTTALL. Fl. of N. A., ii. p. 13.

The blue-berried elder much resembles the common S. Canadensis in appearance, and the flowers might doubtless be substituted. The berries, however, differ much in flavor, being agreeably acid, without the somewhat nauseous taste of our species.

VALERIANA CAPITATA.

WILLD. Fl. of N. A., ii. p. 48.

This species of valerian, which seems to be rather rare in Washington Territory, possesses strongly the peculiar odor of the V. officinalis, and a trial of its virtues would be important, though it

seems that two other European species are much weaker than the medicinal species. "The thick and puriform black root (of V. edulia, Nutt.), although bitter and apparently pernicious, when baked on heated stones, or steamed under ground, is converted into a pulpy mass, sweet and rather agreeable to the taste, and not unwholesome." (Douglas, in the *Flora of N. A.*) This is the "bitter root" of the tribes near the Rocky Mountains, which forms a great part of their food, and has given name to an extensive range of mountains in the interior of Washington Territory. I sent a fresh root to Washington, where it is probably cultivated.

ERIGERON CANADENSE.

LINN. U. S. Disp.

One or more of the officinal species of fleabane, as well as several others, are found in Washington Territory.

HELENIUM AUTUMNALE.

LINN. U. S. Disp.

The "sneezewort," sometimes used as a stimulant, and also as a tonic, is found along the Columbia River.

ACHILLEA MILLEFOLIUM.

LINN. U. S. Disp.

The "yarrow" abounds everywhere near the western coast, where it is indigenous, and not introduced, as with us, from Europe. The western variety is more hairy, and has other slight differences, but the odor and taste are the same.

TANACETUM HURONENSE.

NUTTALL. Fl. of N. A., ii. p. 414, and Bot. of N. St., p. 235.

This species of tansy has a flavor very similar to that of the officinal T. vulgare, but of its properties nothing positive is known.

ARTEMISIA VULGARIS.

LINN. Fl. of N. A., ii. p. 421, and Bot. of N. St., p. 255.

A plant, supposed to be only a variety of the above, grows along the western coast. The European plant has, according to the *U. S. Disp.*, been employed with advantage in epilepsy, etc. (See Absinthium.)

Of the numerous species of artemisia found on the plains near

the Rocky Mountains, some doubtless possess medical value, and nearly all have very strong odors and great bitterness. The A. tridentala (Nutt.) has a reputation for the cure of dysentery, and is the species most commonly called "wild sage." It has, however, more the odor of turpentine than of sage, and animals feeding on it, or even meat laid upon it for a short time becomes uneatable, even when cooked.

The A. dracunculoides (Pursh) is more pleasant, and might, like its European representative called "tarragon," be used as a condiment.

ARNICA AMPLEXICAULIS.

Nutt. Fl. of N. A., ii. p. 456.

Two species of arnica are common in Washington Territory, but of their medical virtues I have no information. As they much resemble the officinal species, they probably are at least as useful.

Numerous other plants of the family Compositæ are found in the territory, and on the great central plains constitute a majority of the vegetable growth. Almost all differ much from eastern species, being peculiarly characteristic of those dry, arid plains. They commonly have strong odor and taste, bitterness predominating as usual with the family. Among them, some will probably be found to take the place of our eupatorium, and other plants of similar properties.

The taraxacum, so abundant with us, does not appear to have been yet introduced there; but some plants very nearly related to it are native, and have a similar bitter milky juice. The genus *Macrorhynchus* is one of those most commonly met with.

ARCTOSTAPHYLOS UVA URSI.

U. S. Disp.

The uva ursi grows abundantly in sandy soil on the western mountains, and along the sea-coast.

I have already referred to the use made of the leaves by the Indians as a mixture with tobacco, by the name of "Kinni kinnik." Used in this way, it has an agreeable flavor, and, if smoked much, produces a peculiar sensation of lightness and dizziness of the head, but without any of the nausea caused by tobacco. It is considered a pleasant ingredient by many habitual smokers.

CHIMAPHILA UMBELLATA.

NUTTALL. U. S. Disp.

The pipsissewa is common in the forests of Washington Territory. The *Gaultheria procumbens*, or wintergreen, sometimes confounded with the above, but easily distinguished by its peculiar and strong flavor, is not found there.

ARBUTUS TOMENTOSA.

PURSH. Eaton's Manual, p. 111, 5th. ed.

This species of the western coast is used as a remedy in diarrhœa, but with what success I do not know. As it belongs to a powerful family of plants, its use should, however, be cautious.

SCROPHULARIA NODOSA.

LINN. U. S. Disp.

This plant, formerly much used in scrofulous diseases, and still sometimes used externally in Europe, grows abundantly in the territory. Its supposed virtues are mentioned in the appendix to *U. S. Disp.*

MENTHA CANADENSIS.

LINN. Bot. of N. St., p 316.

This mint, common also in our Northern States, has the odor of pennyroyal, and might be substituted for it where it is not to be found.

Another agreeably scented plant peculiar to that coast is Micromeria Douglassii, found in forests, and with an aromatic odor.

The flowers of Abronia arenaria, found on the sea-shore, have the odor of orange blossoms, and open in July.

GENTIANA.

A species of Gentian grows near Vancouver, which, like the other American species, might be substituted for the officinal G. lutea, but I do not know whether it equals that plant in medicinal value.

RUMEX SANGUINEUS.

LINN. U. S. Disp.

Several species of dock are found in the territory, some probably introduced, but the one mentioned above seems to be indigenous.

The Indians use its root boiled and scraped, as an application to the indolent ulcers remaining after severe burns, and apparently with good effect.

It is one of the species mentioned in the *U. S. Disp.* as employed officinally.

QUERCUS GARRYANA.

NUTTALL. Continuation of Michaux's Sylva.

This is the only representative of the oaks found in the territory, and, as it much resembles the Q. alba, might probably be used instead of it.

SALIX SCOULERIANA.

BARRATT.

Many species of willow are found in the territory, all of which contain some bitterness in their bark, and may become useful for the manufacture of salicin.

The above has the peculiar and nauseous odor of the leaves observed in the S. eriocephala, which it otherwise much resembles.

ABIES DOUGLASSII.

Flora Borealis Americana.

About ten species of pine and spruce are found in Washington Territory, all of which contain more or less turpentine. The above, called red or black fir, seems to yield it most freely. The hemlock is the only kind common to both sides of the continent.

The sugar pine of California, producing a sweet resin, is not found as far north as the Columbia.

A. menziesii resembles the black spruce (A. nigra), and its leaves might be used for making the "spruce beer."

SYMPLOCARPUS KAMTSCHATICUS.

This plant has precisely the same odor as the officinal S. fœtidus (Dracontium, *U. S. D.*), or skunk cabbage. It grows in similar damp situations, and the leaves are similar, but the flower white or yellowish.

Though the fresh roots would no doubt be very poisonous to men, bears are fond of eating them, and their resorts are to be detected by the leaves scattered around where they have scratched up these roots.

VERATRUM ESCHOLTZII.

TORREY.

This plant resembles V. album perhaps as much as V. viride, and, as those two differ in medicinal properties, it would be unsafe to judge of its value from its resemblance to either. Belonging to a very poisonous order of plants, experiments would have to be cautiously conducted. It is probable that it contains veratria, like the other species, and the extraction of this alkaloid should be the first step.

Other plants of the order melanthaceæ are found in the territory, which have the reputation among the Indians of being poisonous. Of these, *Anticlea Nuttallii* and *Douglassii* are called "Poison Kamass," their bulbs having been used by mistake for those of that plant, and with fatal results.

Gamassia esculenta, the kamass itself, does not seem to possess deleterious properties, even when raw.

It is somewhat singular that no native species of *Onions* is found in those parts of the territory I collected in, but I believe some occur further south and east.

POLYPODIUM VULGARE.

LINN. Variety. (P. falcatum, Kellogg.)

The roots of a fern, considered only a variety of the above, are used by the Indians and settlers under the name of "wild liquorice," to which they have much resemblance in taste, but with a bitter flavor after a few minutes' chewing. They are said to be the principal remedy of the natives in gonorrhœa, etc., but probably with little efficacy. Their value is fully treated of in the appendix to *U. S. Disp.*

ASPIDIUM MUNITUM.

KAUTZ.

The astringent roots of this fern are used in dysentery, and probably have some value.

Several plants are found in Washington Territory which have been occasionally used in medicine, but as they are not peculiar to that country, and I have nothing new to add to the information

given on them in the *U. S. Disp.* and other works, I merely add here a list of them.

Impatiens fulva, Nutt. Jewel-weed.
Œnothera biennis, Linn. Evening primrose.
Antennaria margaritacea, R. Brown. Cudweed.
Kalmia angustifolia, Linn. Sheep laurel.
Plantago major, Linn. Plantain.
Prunella vulgaris, Linn. Self-heal.
Solanum nigrum, Linn. Black nightshade.
Polygonum persicaria, Linn. Lady's thumb.
Populus tremuloides, Mich. American aspen.
Trillium grandiflorum, Dougl. Wake-robin.
Adiantum pedatum, Linn. Maidenhair.

REPORT

ON

DEFORMITIES AFTER FRACTURES.

BY

FRANK HASTINGS HAMILTON.

PART THIRD.

"If the prospect of that which remains to be done, after the labors of so many ages, tends to abate hope and discourage endeavor, yet it should be remembered that no man can determine the measure of success which may be connected with industrious research and zealous exertion."

PEARSON.

PREFACE.

WHEN I had nearly finished this last section of my *Report on Deformities after Fractures*, I found that its great length would compel me to seek some mode of abridgment. I withdrew, therefore, as being of the least value, all the chapters relating to the bones of the trunk, and also the chapter relating to the bones of the foot. I then set myself to work diligently to reduce the still enormous dimensions of the remainder. With what success you will see.

How is it possible, in a matter so entirely new, where everything has to be proven from the beginning, to dispense with the record of the cases, or to abridge their yet inconsiderable number? If the report admits of retrenchment, it is, I think, only in rejecting what relates to treatment; and upon this subject, the Committee of Publication must exercise its own judgment. I confess, however, that this seems to me to be the fruit of the plant, growing naturally upon it, and without which it would be only a very crooked and barren stalk.

Whether these results ought to be regarded as "successful," must be left to the judgment of every man to decide. For myself, I do not hesitate to call them so, when compared with almost any other department of mechanical surgery, and especially when viewed in connection with the extraordinary difficulties which constantly embarrass this branch of our art. Yet they are by no means "satisfactory," nor are they what we may hereafter hope to attain, nor, perhaps, are they what, in the hands of a few skilful surgeons, may even now be attained. I believe, however, that the average skill of the world, wherever the observations shall be carefully made, will present no better success; but not until those who think differently offer some better testimony than vague impressions, or dogmatic assertions, will their opinions merit respectful attention, or demand a serious reply.

It will surprise many, I have no doubt, that, in a report on *Deformities after Fractures*, I have made no mention of the means by which they may be remedied when they have actually occurred. I did not understand this to be the object for which the committee was appointed, but only to declare what these deformities usually were, in order that we might establish, if possible, the true prognosis in fractures. Yet, if this omission is to be regarded as a defect, I trust it will be somewhat repaired by the sections devoted to the treatment, which are intended to indicate how, in some measure, these deformities may be avoided. Moreover, it did not seem to me that I could add much to what has already been written upon this subject by another member of this association, Dr. Geo. W. Norris, of Philadelphia, whose paper, entitled *On the Treatment of Deformities following Unsuccessfully Treated Fractures*, was published in the Oct. number of the *Amer. Journ. of Med. Sci.*, for 1842.

It is possible that wrong inferences may be drawn from the tables by those who do not observe particularly what is implied by the terms "perfect" and "imperfect." I have established for myself a standard by which to regulate the application of these terms, and which can be easily understood by a reference to the full record of the cases; but the standard is arbitrary, and probably would not be regarded as just by all surgeons. Indeed, it has frequently happened to me to examine broken limbs which have been carefully measured by other surgeons and found shortened one-quarter or one-half, or even three-quarters of an inch, but which they have chosen to call "perfect." With such a standard as these gentlemen adopt, the proportion of perfect cases in my tables would have been very greatly increased, and, perhaps, art would have been less scandalized, but I know that truth would have been less faithfully vindicated.

CHAPTER XIV.

FRACTURES OF THE FEMUR.

Upper Third.

Neck.

CASE 1. *Simple fracture; probably within the capsule. Result imperfect.*

James Barry, æt. 52. Simple fracture of the femur through the neck.

Drs. M. and L. in attendance. They used a straight splint three weeks, and then permitted him to go about on crutches.

I examined the limb three months after the accident occurred, and found it shortened one inch and a half.

CASE 2. *Simple fracture within the capsule. Result imperfect.*

Dec. 12, 1850, Thomas Kellogg, æt. 77, of Bloomfield, N. Y., fell through the hold of a steamer at Buffalo, striking partly upon the right trochanter, and bruising also other parts of his body severely.

Dr. W. was called, and, on the following day, Dr. C., by request of Dr. W., was added to the counsel. They noticed that the flesh and skin were bruised over the right trochanter, and apprehended a fracture of the neck of the femur, but, after a very careful examination, they could not discover any satisfactory evidence of such a fracture. The limb was not shortened, nor were the toes turned either outward or inward, unnaturally; but whenever attempts were made to flex the limb, it was very painful, and the limb moved spasmodically.

After about two weeks, Dr. W. discovered that the limb was shortened. Dr. C. had seen the patient three or four times with Dr. W., and neither of these gentlemen found any shortening until now. A straight splint was immediately applied, with extension and counter-extension.

From that time until the period of my examination, about six months after the accident, it continued to shorten. He could

notice a marked difference during the last month. Dr. W. was present with me at this examination. The limb measured just three inches less in length than the other; the motions at the joint, or at the seat of fracture, were tolerably free; his toes were neither inclined outwards nor inwards, unnaturally. The trochanter was not much flattened, and seemed to move on a long radius when the thigh was rotated. He used crutches, and bore no weight on the limb in walking. The thigh seemed to give way, or "spring," when he settled his body upon the limb.

CASE 3. *Simple fracture. Result imperfect.*

Eddy, of Potter's Corners, Erie Co., N. Y., æt. 78, fell, July 28, 1847, striking on the trochanter major. He fell about four feet.

Dr. N. in attendance. Dr. N. laid his limb over a double inclined plane.

I was requested to see him in consultation thirty-six hours after the accident. The leg was everted, and any attempts to rotate it in the opposite direction were very painful. I could not detect crepitus. The trochanter was carried upwards and backwards, and the limb shortened one inch.

I recommended a continuance of the treatment for the present. Subsequently, a straight splint was employed, but only for a short time.

I have never seen Mr. Eddy since, but I have learned from Dr. N. that he was able to get upon crutches in about eight weeks, and that, during the four or five years in which he continued to reside in this country, he used a cane, and walked with a manifest halt. Precisely how much the limb was shortened, he was unable to say, yet he knew it was shortened.

CASE 4. *Simple fracture without the capsule. Result imperfect.*

Mrs. Jane Stewart of Buffalo, æt. 73, fell, July 4th, 1847, while descending a flight of steps, striking upon the trochanter major of the right side.

Dr. B. in attendance. Dr. B. requested me to see Mrs. S., on the twenty-ninth day after the accident. No splint had been applied. The limb was shortened half an inch. The leg was everted, but could be easily rotated inwards. No crepitus. The principal pain which she suffered was below the trochanter major. The whole limb was œdematous. She had also incontinence of urine. Dr. B. had been obliged to give her opium freely, to alleviate her pains.

No change in the treatment was recommended.

During the first three or four months she was unable to lie down, and for about one year she was unable to walk. From this time, she gradually recovered her health and strength, and walked with considerable ease, but with a halt. She survived the accident five years, her death having no connection with this injury. The limb was never measured after I saw her.

CASE 5. *Simple fracture within the capsule. Result imperfect.*

Mrs. Wright, a German woman, living in Buffalo, æt. 66, broke the right femur through its neck, by a fall upon the ice, Jan. 25, 1850. She was admitted to the hospital on the same day.

I could not detect any crepitus, nor was there any shortening of the limb; the toes were turned out, so as to lie flat upon the bed. We suspected a fracture of the neck of the femur. The patient was laid in bed upon her back, and pillows were placed under her knees.

Feb. 1. We found the leg shortened, and we laid it over a double inclined plane. On the 10th of February, she had bed-sores, and the splint was removed, the limb being placed again over pillows.

This treatment was continued until the 28th of Feb., when she left the hospital, and I have not seen her since. Shortly before she left, we found the thigh shortened half an inch.

CASE 6. *Simple fracture. Result imperfect.*

Mrs. Catharine Brenoe, æt. 50, broke her right thigh through its neck, either in February or March, of 1852. She was standing upon a box, three feet high, when she fell, striking upon her right hip.

Dr. H. was called. She was laid upon a bed, but no splints were applied.

July 20, 1852, she was admitted to the Buffalo Hospital, of the Sisters of Charity. Dr. W.'s service.

Oct. 1, 1853, I found this woman in my ward. During all of my previous service, she had been in a private ward, and my attention had not been called to her. She had had no surgical treatment beyond confinement in bed, and this, I understand, was voluntary. Her thigh was shortened one inch and a half, and rotated outwards. The trochanter major rotated on a very short axis. There was also a kind of click, or crepitus, at this point. It hurt her very much to abduct the thigh.

I directed that she should be got out of bed into a chair. This, with great labor, was soon accomplished; but, after a few months, I found her again lying in bed, and I could never again persuade her to get up. There was no necessity for this, I think, beyond her own strong disinclination to do otherwise.

Nov. 1, 1856. Nearly five years after the accident, she still occupies the same bed, yet her health is tolerably good, and no sufficient reason exists why she should not walk about or sit up.

CASE 7. *Simple fracture. Result imperfect.*

Mrs. Catharine Langen, æt. 84, while carrying a bundle of wood, her foot slipped and she fell, striking on the left trochanter. She was admitted to the hospital on the following day (Jan., 1856). Dr. B., hospital surgeon, in attendance.

Dr. B. could not discover either crepitus or shortening, but the foot and knee were everted. She was directed to lie still in bed. Subsequently, Dr. B. thought that he detected crepitus, but I was unable to do so at any time.

She left the hospital, Aug. 31, 1856, about eight months after her admission, unable to walk, except with crutches. The thigh is shortened half an inch; toes not everted. The trochanter major feels broad and flattened, and the upper part seems to be thrown inwards towards the body. I now suspect that this was a fracture of the neck close to the trochanter, and involving the trochanter itself; and also that it is a case of impaction of the neck. The great breadth of the trochanter is probably due to an abundant ossific deposit. I believe it has united by bone.

CASE 8. *Simple fracture. Result imperfect.*

James McLaren, æt. 65. Admitted to the Buffalo Hospital, Sept. 8th, 1855, with a fracture of the left thigh-bone through the neck. His account of his injury is that, on the 28th of August, he was struck violently on the inside of his left thigh, near its upper end. The blow was, no doubt, sufficient to break the thigh-bone, but it is difficult to understand how it should have been broken through its neck by a blow given in that direction.

He was at first seen by Dr. H., who called it a fracture of the neck of the femur. I do not know what treatment he adopted. When he became an inmate of the hospital, Dr. S. laid him in a modification of Gibson's splint.

Oct. 1, 1855, I found him still lying within the same apparatus,

but without extension or counter-extension being made. The thigh was shortened three-quarters of an inch. I directed him to get up and use crutches. No dressings were subsequently applied.

March 31, 1856. He was still in the hospital, walking with a cane, and with some halting in his gait.

CASE 9. *Simple fracture. Result imperfect.*

Catharine Bletzer, æt. 79, fell upon an icy side walk, in Dec., 1855, and was admitted to the Buffalo Hospital, on the 20th of the same month.

Her left thigh was broken through its neck. As she lay upon her bed, the left side of the pelvis was drawn up, and her toes were everted. I directed pillows to be placed under her knees, and that she should remain upon her back, but that, as soon as possible, she should get up and walk about with crutches. She remained, however, nearly one year in bed.

Feb. 10, 1856. She left the hospital, still unable to walk, and having only for a short time found herself able to sit up.

CASE 10. *Simple fracture without the capsule. Result imperfect.*

R. W. S., late surgeon in U. S. army, of North East, Pa., æt. 31, fell from a height, striking upon his feet, and breaking the neck of the right femur.

His limb was laid on a straight single inclined plane, the foot being six inches higher than the hips. Extension was made by means of weights attached to bands passing over a pulley at the foot of the splint; the weight of the body accomplished the counter-extension. At the end of ten weeks, he left the splint and began to use crutches.

Thirty-six years after the accident, I examined the limb, and found it shortened one inch and three-quarters. The union of the fragments was very firm and unyielding, and seemed to have been effected through the medium of bone. The foot and leg were slightly everted. Notwithstanding this amount of shortening, and although he used no extra heel to increase the length of the limb, he walked with only a moderate halt.

CASE 11. *Simple fracture. Result unknown.*

Isaac Lang, of Colden, Erie Co., N. Y., about 40 years old, broke his left thigh through its neck. I saw him Nov. 3, 1853, fourteen hours after the accident occurred. The messenger said that the

attending surgeon, a very intelligent gentleman, called it a dislocation. Such, indeed, I found was his opinion, after my arrival at the house.

I found the hip much swollen; the thigh rotated outwards, and shortened half an inch. Having placed him under the influence of chloroform, crepitus was easily detected.

I applied my own straight splint with adhesive plaster extension.

He recovered in the usual time, but I have never learned the exact result.

CASE 12. *Simple fracture within the capsule. Result imperfect.*

Mrs. F. W., of Buffalo, æt. 51. Feb. 3d, 1847, she slipped and fell upon an icy board, striking upon her left trochanter major. Dr. B. was called. There was no shortening of the limb, but the foot was slightly everted. Yet the doctor apprehending a fracture, had directed her to remain quiet in bed and upon her back, with her knees over a double inclined plane.

On the third day I visited Mrs. W. with Dr. B. The limb was now shortened half an inch. No crepitus. I left her in charge of Dr. B. She remained in bed ten weeks.

May 29, 1854, seven years after the accident, I found her walking with a cane, and limping a good deal. The limb was shortened. The thigh and leg were slightly rotated outwards. She had suffered more or less pain ever since the accident occurred, and at times the pain had been very great. She had been blistered and cupped; setons had been used, and cold baths. The latter alone had benefited her.

Sept. 10, 1856, nine years after the accident, I found her still walking with a cane, but able to walk without it. Her toes turn out, and her thigh is shortened one inch. The flexors of the thigh are not sufficiently strong to lift the limb when the knee is bent.

CASE 13. *Simple fracture. Result imperfect.*

Mrs. Dally, of Buffalo, æt. 67, fell, Oct. 19, 1853, from a trunk upon which she was standing, and struck upon her right hip.

I saw her soon after the accident occurred. The thigh was shortened half an inch. Toes everted. Hip excessively painful when moved; the pain was also accompanied with frequent spasmodic contractions of the muscles about the hip. No crepitus.

I laid her upon her back, with her knees over pillows, so as to elevate them very slightly. I supported the foot also in such a

manner as to prevent eversion of the toes. She was directed to leave her bed as soon as possible, and to get about on crutches.

Oct. 22, 1854. She walked with a cane, but not without limping. The thigh was shortened one inch.

CASE 14. *Simple fracture without the capsule. Result imperfect.*

John Sheenan, æt. 39, a United States soldier, received in battle a blow upon the left trochanter major, from the butt end of a musket, fracturing the neck of the femur, probably without the capsule.

He was confined in a long, straight splint six weeks.

Six years after the fracture, I found the thigh shortened two inches, and the toes slightly turned out. In rotating the limb, the trochanter major moved upon a very short radius. There was considerable motion at the seat of fracture, and he was unable to walk unless the fragments were in a certain position.

Drs. Pride and Boardman, of Buffalo, were present, and confirmed the results of this examination.

CASE 15. *Simple fracture, within the capsule. Non-union of fragments, &c.*

Christophe Nirlear, a German emigrant, æt. 57. While in Montreal, C. E., he fell ten feet upon the wharf, breaking his left femur through its neck. In his fall he struck first on his feet and then pitched forwards. He was taken to a hospital, the surgeons of which probably supposed it to be a dislocation. They pulled violently upon it when he was first admitted, and they repeated the same at a subsequent period, but they did not dress the limb with splints or apply any permanent extension.

Dec. 11, 1853, three years after the accident occurred, he applied to me at the Buffalo Medical College Dispensary, for advice and relief.

I found the thigh shortened one inch and a half. When standing, the thigh was slightly rotated outwards, but it was not at all when he was lying on his back. I could feel the trochanter major, and the neck of the bone leading from it distinctly; the neck lying upon the back of the pelvis, and terminating abruptly as if broken off close to the head. The head could not be felt. The broken neck seemed to play upon the back of the pelvis as if a new joint was formed at that point, but I could not feel anything like a socket. The end of the bone was smooth and round. He walked tolerably well with the aid of a cane.

CASE 16. *Simple fracture. Result imperfect.*

Mrs. Wadsworth, of Buffalo, æt. 51, fell and broke the neck of the right femur, in the year 1841. Drs. T. and W. in attendance. No splints were used. She was not able to walk under six months.

In 1848, seven years after the accident, I found the thigh shortened three-quarters of an inch.

CASE 17. *Simple fracture, without the capsule. Death.*

Dec. 27, 1851, L. F. T., of Buffalo, æt. 42, fell upon a slippery sidewalk, breaking the neck of the left femur. Mr. T. weighed about two hundred pounds, and he fell with his whole weight upon his left trochanter. He was unable to get up or to walk.

Dr. B. was first called, but at his request I was invited to see Mr. T. on the same day, and to take charge of him.

The toe and knee of the left leg were turned out and could not be turned in except by great violence, and by the infliction of great pain. The limb was shortened from one-quarter to one-half an inch. Much pain in the groin and along the whole length of the limb. No crepitus. Drs. S. and B. concurred with me in the opinion that the femur was broken at its neck.

I applied a straight splint, with extension and counter-extension.

Feb. 7th, on the forty-second day (six weeks), I removed finally all of the dressings. On the 9th he sat up. On the 10th he walked about the room with the aid of crutches and a strong male assistant. On the 11th, also, he walked, in the same manner, across the room, came back to his bed, and as he settled his head upon his pillow, he died.

CASE 18. *Simple fracture. Resulting in death.*

Mrs. Sarah Pattison, of Buffalo, æt. 76, slipped and fell on her hip, breaking the neck of the femur, Aug. 26, 1846.

Dr. A., of Buffalo, was in attendance, and subsequently requested me to see the case with him. Mrs. Pattison had been for some time in feeble health, but at the time of the accident she was able to walk out.

Her limb was laid for a time over a double inclined plane, but it was not confined rigidly to that posture. She recovered from the accident so far as to walk, with considerable assistance; but her health had suffered greatly from the shock and from the confinement, and she died a little less than four months after the accident occurred.

CASE 19. *Simple fracture, within the capsule. Result imperfect. Prosecution for alleged malpractice.*

The following report of the trial to which this case gave rise, was written by myself, for publication, in 1849, and contains all of the essential facts:—

"*Prosecution for Alleged Malpractice.*—Supreme Court.—John C. Basset *vs.* John B. Collins and Anthony Barney.

"In the fall of 1843, John C. Basset, of Independence, Alleghany County, aged 48, then in good health, but corpulent, was injured by the upsetting of his wagon and the falling of a box, as was believed, upon his thigh. He was carried into a public house in Woodhull, and there attended by Drs. Reed and Carey. After a careful and complete examination by measuring, etc., they concluded that Mr. Basset had only received a severe bruise.

"He remained two weeks under their care and was then taken home in a bed. Four weeks after the accident, Drs. Collins and Barney were called in, as the left leg was now said to be shortened and turned out. These gentlemen made an examination, and found the leg in the following condition: Shortened an inch and a half; the toes turned out and could not be turned in; the left heel corresponding to the hollow of the right foot; a bunch in the groin like the head of the femur.

"They decided that it was a dislocation of the head of the femur upon the pubis, and with pulleys properly adjusted and carefully operated upon, proceeded to attempt its reduction.

"After two or three minutes' extension and counter-extension, a sound was heard, and a sensation felt by nearly all who were assisting, which was by them described as the sound and sensation usually produced when a dislocation is reduced. The patient was now released from the pulleys and made to get up. The limb was of its original length, and in its natural position, and the tumor in the groin had disappeared. The patient was again laid upon the bed, and dismissed as cured.

"It however appeared in testimony, that a few days after, it was again shortened and turned out; but it does not appear that these facts came to the knowledge of the defendants. It also appeared that the plaintiff did not get the use of his limb so as to be able to dispense with crutches or a cane, in one or two years.

"The limb is now shortened an inch and a half, and moderately turned out; but the motions of the joint are free, and the plaintiff walks with a very slight halt and without inconvenience.

"Drs. Collins and Barney were prosecuted, and the case was tried in January, 1848, before Judge Marvin, but the jury having disagreed, it was again tried before Judge Mullett, in the Circuit of the Supreme Court, held in August, 1848, in the town of Angelica, Alleghany Co., N. Y.

"In the first trial the plaintiff charged that the limb was sound when the defendants took hold of it with the pulleys, and that they then fractured it through the neck and without the capsule.

"In the last trial this was not claimed, but it was alleged that the original accident was probably a fracture without the capsule, and without displacement; that when examined by Drs. Collins and Barney, a displacement had occurred, and that the defendants were chargeable with criminal negligence or ignorance in not discovering that it was a fracture; and consequently for subjecting the plaintiff to the useless pain of extension with the pulleys, and in not applying subsequently a retentive apparatus, since through this omission the plaintiff had a shortened and crooked leg.

"On the defence it was admitted that the original accident was a fracture without displacement; but that it was *within* the capsule and near the head of the bone; that its being within the capsule and near the head could alone satisfactorily account for the "bunch" in the groin, which disappeared with the reduction, and for the slowness of the subsequent restoration of the limb. It was claimed, also, that the signs described by the witnesses were the ordinary signs of a dislocation upon the pubis, and would be likely to deceive the most skilful surgeon; that several eminent surgeons had mistaken fractures of the thigh for dislocations; that the extension with the pulleys did him no permanent injury; that the subsequent treatment pursued by the patient in this case, viz: keeping his bed for a few days and then getting about on crutches, would have been the proper treatment had the exact nature of the accident been fully known; and finally, that the patient had as good a limb as can ordinarily be expected in this fracture, under the most skilful management.

"The examination of the numerous witnesses having closed, the jury were addressed by the distinguished gentlemen, Messrs. Doolittle and Skinner, for the defendants; and the Hon. Judge followed with a most pungent and impressive charge, in which the jury were instructed to disregard all mere appeals to their prejudices, and especially to reject that counsel which would advise them to look upon the medical profession as an *oppressive and aristocratic mono-*

poly, and to decide the case upon the facts as drawn from the witnesses on the stand.

"The jury retired, and in a few minutes returned a verdict for the defendants.

"The defendants in this case were men who have long practised both medicine and surgery in the county of Alleghany; Dr. Barney, at Independence, and Dr. Collins, at Alfred, and they both occupy a high position in the estimation of the public, as men of skill and worth; and it is gratifying to know that in the mind of the Hon. Judge, as well as of the intelligent jury, they received a full and unqualified acquittal from the charge of any degree of negligence or unskilfulness."

CASE 20. *Simple fracture without the capsule. Result imperfect.*

Mrs. Mary Goodwin, æt. 84, fell from a chair, striking on the left trochanter, Oct. 2, 1856. In the following week, Oct. 12, she was admitted to the Buffalo Hospital of the Sisters of Charity.

I found the toes of the left foot everted, and after considerable manipulation I detected a slight crepitus. Limb shortened one-half or three-quarters of an inch. On moving the limb she complained of pain, especially near the trochanter minor.

I laid her upon her back, with pillows under her knees, applying no dressings or apparatus. Her health evidently declining, she was ordered beer, good diet, and tonics.

In about six weeks she was able to get out of bed and to rest upon crutches. The fragments were then firm, and I have no doubt, united by bone. The limb still remains, five months after the accident, slightly everted, and shortened one-half or three-quarters of an inch. She is walking about the hospital a little on crutches, but she cannot yet bear any weight on the limb.

CASE 21. *Simple fracture without the capsule. Result imperfect.*

Frederick Clever, of Buffalo, æt. 54, was thrown from his carriage upon the frozen ground, striking upon his right trochanter, Dec. 21, 1856. Dr. H., of Buffalo, was called, and recognized the accident as a fracture of the neck of the femur, without the capsule. He laid the limb carefully over a double inclined plane. Dr. H. had found the limb everted, and shortened one inch, immediately after the accident, but he could not detect any crepitus.

On the following day, Dr. H. requested me to see the patient with him. The limb was still shortened one inch. No crepitus, nor

eversion. No ecchymosis, nor swelling. He could not lift his limb, but it did not hurt him very much to have it moved, except near the trochanter minor.

On the third or fourth day, Dr. H. applied my long straight splint, and removed it finally, Feb. 1, 1857, six weeks from the time of the accident. The fragments then seemed to be firmly united. The same shortening as at first. Soon after this, he began to walk on crutches.

Through Trochanter Major.

CASE 22. *Simple fracture. Fragment displaced.*

James Redick, a travelling showman, æt. 23, fell, in Aug., 1848, from a high wagon, striking upon his left hip. When he got upon his feet he was unable to walk. Dr. W. was employed. Two weeks after the injury was received, I was requested to see him. I found the trochanter major carried upwards towards the crest of the ileum half an inch, and also slightly sent in: but the thigh was not shortened. There was no crepitus.

Oct. 11, 1848, I examined the patient, and found no change in the position of the fragment. The functions of the limb were, however, almost completely restored.

Below Trochanter Major (Upper Third).

CASE 23. *Simple oblique fracture. Result imperfect.*

Wm. Borton, æt 27, a healthy English laborer, was thrown from a load of wood, Jan. 28, 1857, breaking his right femur near the lower end of the upper third. Fracture oblique and simple.

I saw him a few hours after the accident occurred, and immediately dressed the limb carefully, with Dr. Charles Ap. Bowen's straight splint.

Finding my patient in excellent health, and with moderate swelling of the limb, and disposed to aid me in every way to secure as perfect a result as possible, with no complications of any kind to embarrass me, I determined to ascertain what my own skill could do, and to spare no time or pains in the effort. Everything, therefore, was made as tight and strong as the patient would bear. From this time, during four weeks, I visited him every day, with but two or three exceptions. At almost every visit, I tightened the screw, and readjusted such of the dressings as were in any degree loose.

On the 4th of February, six days after the occurrence of the fracture, I substituted my own single straight splint for Dr. Bowen's, in order that I might make both extension and counter-extension at the same moment, by means of the screw placed at the foot.

Feb. 17, three weeks after the occurrence of the fracture, I found the bones united pretty firmly, but I did not relax my extension until the end of four weeks. After this date, I visited him less often—once in two days—and only tightened the dressings moderately from time to time.

March 10, six weeks after the fracture occurred, I removed all dressings, and found the limb shortened three-quarters of an inch, the upper fragment lying upon the outside (not in front) of the lower, and being plainly felt on the outside of the limb. The line of the whole limb was perfect. There were no excoriations in the perineum, or about the ankle. Adhesive straps were used in extension.

This limb had been dressed with extraordinary care, with numerous carefully made junks to protect the joints, &c., and with nicely moulded felt splints about the thigh, with rollers, &c. &c., and never was the extension allowed to become relaxed; yet from the beginning to the end, the measurements carefully repeated always gave the same shortening, viz., three-quarters of an inch.

CASE 24. *Simple fracture. Result nearly perfect.*

Martha Barker, æt. 7, was run over by a loaded wagon, Aug. 2, 1852, breaking her thigh through its upper third.

Dr. L. was immediately called, and dressed the limb temporarily; on the following day he sent for me.

Assisted by Dr. L., I applied my own straight splint, with gutta percha side splints. We used also the adhesive plaster straps for extension.

Sept. 3, the splints were finally removed. Limb perfectly straight, and shortened one-quarter of an inch.

Sept. 10, 1856, four years after the accident, we could not discover where the fracture occurred.

CASE 25. *Simple oblique fracture. Union delayed. Result imperfect.*

Sidney Allen, of Rochester, aged about 30 years, was thrown from a carriage, May 16, 1840, breaking his right femur just below

the trochanter major. Direction of fracture, obliquely downwards and backwards. He was also severely stunned by the fall.

I dressed the limb with Gibson's modification of Hagedorn's splint, making counter-extension, however, by means of a perineal band. I applied also lateral splints with bandages, &c., and made extension with a silk lined gaitre. At the end of fourteen days, slight ulceration had occurred upon the instep, and the perineum was very intolerant of pressure. I removed, therefore, the straight splint and applied a double inclined plane. During the six first weeks, I drew off his urine daily with a catheter, the bladder having for the time lost the power of expulsion of its contents. Bony union was delayed until about the tenth week, and, before it was accomplished, it became necessary to place him again upon the straight splint.

The thigh is shortened three-quarters of an inch, and he limps very badly.

CASE 26. *Simple fracture. Result imperfect.*

G. B., M. D., of Livingston Co., N. Y., fractured his right femur in the year 1845. The fracture was oblique, and about three inches below the trochanter major.

Dr. C., late Professor of Anatomy at Pittsfield Med. College, was requested to take charge of the limb, and, at the instance of Dr. B. himself, he treated the case throughout with a double inclined plane.

I saw Dr. B. at my office, May 12, 1847, and found the thigh shortened one inch and a half, but firm, and nearly as useful as before.

CASE 27. *Simple fracture. Result imperfect.*

E. Richardson, æt. 42. Simple fracture through the upper third. (I have no record of the name or residence of the surgeon.)

Four years after, I found the thigh shortened three-quarters of an inch, and slightly bent at the seat of fracture.

CASE 28. *Simple fracture. Twice broken at same point. Result imperfect.*

Morris Cassady, æt. 9, fractured his right femur through its upper third. Surgeon Shields, of Ireland, treated the fracture each time.

Thirty-one years after, I find the thigh shortened one inch and a

half. The point where the fragments overlap can be distinctly felt. He walks with only a slight halt.

CASE 29. *Simple fracture. Result imperfect.*

Antonio Gode, of New York, æt. 55, fractured the thigh through its upper third. He was treated at the New York City Hospital, with straight splints and extension. The extension was made with adhesive plasters.

June 10, 1852. When I examined the thigh, six weeks after the fracture had occurred, it was united with a shortening of three-quarters of an inch. The patient says the same thigh had been broken before at the same point, and that it shortened some at that time, but that it is shorter now than before.

CASE 30. *Simple fracture. Result imperfect.*

John Cartwright, of Tonawanda, æt. 49, fractured his femur through its upper third.

Dr. L., of Tonawanda, had charge of the case. He laid the limb upon a double inclined plain.

Seven weeks after the fracture had occurred, I examined the limb, and found it united with a shortening of half an inch.

CASE 31. *Simple fracture. Result imperfect.*

John Moffat, of Buffalo, about one year old, fractured the right femur near the lower end of the upper third, by a fall from his bed.

Dr. W. in attendance. The lad was very fat, and the application of splints was rendered exceedingly difficult. No extension or counter-extension was used, nor a double inclined plane, but lateral splints were applied with as much care and diligence as possible.

One year after the accident, April 15, 1852, I found the bone slightly bent forwards at the seat of fracture, and, when he walked, the toes were inclined to turn inwards. I could not detect any shortening of the limb.

CASE 32. *Simple fracture. Result imperfect.*

John Redman, of Buffalo, æt. 40, was admitted to the hospital with a fracture of the right femur near its upper end, Aug. 8, 1849.

The fracture was simple and oblique. On the following day, I applied a paste bandage to the leg and foot.

On the 10th, I applied side splints, and secured the extending and counter-extending bands to a straight splint.

With only slight modifications, these means were continued until the 26th of August, a period of eighteen days, when a double inclined plane was substituted for the straight splint.

Sept. 11, all dressings were removed, and the bones were found to be united with a shortening of half an inch.

CASE 33. *Simple fracture. Result imperfect.*

William Murphy, æt. 13, fell from a pile of boards, Oct. 28, 1855, fracturing the left femur at the lower end of the upper third. He fell upon his side. Fracture simple.

Dr. B., one of the hospital surgeons, dressed the leg at my request. He applied Potter's straight splint, making extension with adhesive straps, and counter-extension with a perineal band. A roller was applied to the whole limb, and also four lateral splints to the thigh, made of binder's board.

I subsequently took charge of the case, and although I examined the limb daily, and took great pains, by renewing and retightening the dressings, to render the cure as perfect as possible, yet the bone united with a shortening of one inch. The axis of the limb was, however, as nearly straight as this amount of overlapping would permit.

January 5, 1856, ten weeks after the accident, he was still walking on crutches.

CASE 34. *Simple fracture. Result imperfect.*

Almon Carpenter, of Buffalo, æt. 5, was struck by a heavy gate, Aug. 16, 1852, breaking his left thigh near the lower end of the upper third.

On the same day I applied a straight splint, with side splints.

Sept. 13th, four weeks after the accident occurred, I removed all dressings. The fragments were united, but with an overlapping of three-quarters of an inch. Limb straight.

I did not reapply the splints. At the end of eight weeks he was walking, and without any perceptible halt.

CASE 35. *Simple fracture. Result imperfect.*

Mrs. S. C. P., of Buffalo, about 55 years old, fell down a flight of steps, Feb. 24, 1853, breaking her thigh near the lower end of the upper third. Dr. T. and myself in attendance.

I dressed the limb with Welch's splint, using it at first as a double inclined plane. On the seventh day I converted it into a straight splint, and laid her upon a fracture bed. I used adhesive plasters for extension.

April 7th, I removed all dressings. Limb was found to be straight, but shortened half an inch. The knee and ankle remained very stiff, and lame for many months, but she was at length able to walk as well as before.

CASE 36. *Simple fracture. Result imperfect.*

"Mrs. E. Howard, of Buffalo, æt. 47, was injured by the upsetting of her sleigh, the sleigh falling upon her left side, Dec. 24, 1854. Dr. L., of Buffalo, was called, but on the same day requested me to take charge of the case with him.

"I found her a feeble, dropsical woman. The left thigh was broken at its neck. The whole limb was greatly swollen and exquisitely tender. The toes were everted strongly, and could not be moved. The limb was shortened one inch. The muscles were frequently contracted spasmodically. We gave her chloroform, and then detected a distinct crepitus.

"She was laid upon her back, in bed, with her knees over a couple of feather pillows. The foot was supported by bolsters. On the following day I laid the limb over Welch's double inclined plane, using great care to cushion and support the limb. My purpose, in laying the limb on this splint, was to support and steady it in such a manner as to save her from the great pain which she suffered whenever the limb was in any way disturbed. Nothing, however, in this respect was gained, and I soon changed it for my own straight splint.

"Jan. 5, 1855. She still continued to suffer greatly, and I laid aside all apparatus, and placed her on one of Coolie's fracture beds."

The above is the record of this case which I had prepared for publication, when, Sept. 8, 1856, I visited Mrs. Howard at her house, and found her confined to her bed with ascites, and other chronic maladies. She permitted me to examine her broken limb, when, for the first time, I found unequivocal evidence that the fracture had occurred through the *shaft* of the femur, instead of through the *neck*. The dropsical and inflammatory swelling had now entirely disappeared from this part of the limb, and the bone could be distinctly felt bent forward at the seat of fracture, and irregular in its form. This part of the limb also remained tender. The limb

was shortened one inch. She has never walked without a crutch or cane since the accident. Her knee, she says, has been the greatest source of lameness.

It is due to myself to say, that I was in some doubt during the first six or seven days, as to whether it might not be a fracture of the shaft rather than of the neck. The swelling of the limb was always such that, even when she was under the influence of chloroform, a satisfactory diagnosis was difficult: but after several careful examinations I felt quite certain that the fracture was through the neck, and so recorded it.

CASE 37. *Simple fracture. Re-fractured at same point. Result imperfect.*

James Leacock, æt. 29, fractured his thigh at the lower end of the upper third, by a fall from a height upon the ground. Dr. P., of Portageville, Livingston Co., N. Y., was employed. He treated the limb with a straight splint, and in about six or seven weeks he was able to leave his bed, with the limb shortened about three-quarters of an inch. This is the statement made to me by Leacock himself.

Dec. 27, 1848, about nine months after the first fracture, he fell upon his knee with moderate force, and re-fractured the limb at the same point.

On the same day, he was admitted to the Buffalo Hospital of the Sisters of Charity, and I applied my own straight splint, with lateral splints, &c. The limb was easily brought down so as to be of the same length as before the last fracture occurred; that is, to within three-quarters of an inch of the length of the opposite limb.

On the 29th, vesication had occurred upon the top of the ankle, from the pressure of the gaitre. The extending bands were loosened, and the gaitre readjusted. Notwithstanding great care was used to prevent this event, a slough occurred above the heel on the 3d of June. From this time to Feb. 16, we were compelled, by his constant complaints, and by his restlessness, to change the mode of extension and support often. The extension was made from above the ankle, from above the ham, from above the knee, alternately, or at the same time, with adhesive plasters and cotton, or flannel rollers; once, for a short time, the double inclined plane was used.

Feb. 16, fifty-two days from the commencement of the treatment, we found the bone united, and the limb of the same length as before; that is, shortened three-quarters of an inch.

In this case, there were present the usual sources of difficulty, to which were superadded an exceedingly irritable temperament, and the previous occurrence of fracture at the same point.

CASE 38. *Simple fracture, occurring four times consecutively at the same point. Very great shortening.*

J. H. Frick, of Williamsville, Erie Co., N. Y., sent for me, June 18, 1849, having broken his left femur sixteen days before I saw him, by jumping from a wagon. The fracture was at the lower end of the upper third.

This is a remarkable case. When only 16 years of age, he first broke this thigh by a fall on the sidewalk. A Thompsonian, who was living at Williamsville, dressed it with only short side splints. Union was delayed, and, at the end of nine weeks, he sent for a man by the name of Smith, who had once been a blacksmith, but who was now a Doctor Smith, and set bones instead of horseshoes. Smith bound the limb with leather, and after five weeks more union occurred. One year from this time, he broke it again, while carrying a moderate weight in his hands. Smith dressed the leg this time also, and in the same manner. The bone united in about two weeks. At the age of 22, he broke it again. So Smith said. And Smith treated it successfully again. Each time the fracture was at the same point. On this last occasion, he employed an experienced surgeon, Dr. Van Pelt, of Williamsville. Dr. Van Pelt had treated it with a straight splint, and the bone seemed already firm on the sixteenth day. The limb was shortened, according to measurements made by Drs. Van Pelt, Hawley, and Mr. Otis, medical student, with myself, three inches and seven-eighths. It was, however, as perfect in all respects as it was before the last fracture.

CASE 39. *Simple fracture, complicated with other injuries, resulting in death.*

Thomas Ryan, of Buffalo, æt. 14, was injured by the cars, at Syracuse, breaking his left thigh just below the trochanter minor, severely bruising the right leg, and rendering necessary the amputation of the right arm above the elbow joint. The amputation was made, and the limbs dressed, by a surgeon in Syracuse.

About three weeks after the accident occurred, he was brought to Buffalo, and I was requested to see him. The stump had not yet healed. There was a large abscess discharging freely in the vicinity of the right knee. The broken thigh was resting upon

Day's splint, the splint being extended. Extension was made with adhesive plasters, but there was no counter-extending band. It was neatly bandaged, and carefully adapted side splints supported the fragments. No union existed between the ends of the fragments, and they were overlapped three-quarters of an inch. I reapplied the same dressings carefully, so far as it was necessary to do so, and dressed the wounds. On the following day, an empiric was employed, and in about one week he died.

CASE 40. *Simple fracture. Result perfect.*

——— Rohan, an Irish lad, of Buffalo, N. Y., æt. 9, fell, July 12, 1851, and broke his left femur about its middle.

I dressed the limb with my own straight splint, using extension and counter-extension; the extension being made with a paste gaitre. I also applied side splints.

Aug. 9th, four weeks from the time of the fracture, union was complete, and without shortening or deformity. I removed the long splint, but continued the side splints.

At the end of three months the limb was in all respects perfect.

CASE 41. *Simple fracture. Result perfect.*

John Gortz, of Buffalo, æt. 13, fractured his — femur in its middle third, Feb. 21, 1849. On the same day he was received into the Buffalo Hospital, and we applied a starch bandage from the knee to the toes.

Feb. 24, the bandages being dry, the straight splint was adjusted, and extension made. Lateral dressing was also applied.

March 14, the fracture appeared firm.

March 23, the bandages and splints were removed, and the leg was found sound and perfect. No excoriations had occurred on the foot or leg.

CASE 42. *Simple fracture. Result perfect.*

Wm. C.——, æt. 9, was kicked by a horse in the fall of 1852, in consequence of which his right thigh was broken about its middle. The fracture was simple. Dr. C., of Pendleton, N. Y., had charge of the limb.

Oct. 30, 1853, one year after the accident, I found the thigh not shortened, but the bone was bent forwards and a little outwards at the seat of fracture.

CASE 43. *Simple fracture. Result perfect.*

Samuel Benson, æt. 3. Simple fracture of the thigh near its middle. A surgeon in Johnstown, N. Y., was employed.

Sixty-three years after I find the limb in every respect as perfect as the other.

CASE 44. *Simple fracture. Result perfect.*

Peter John, æt. 15. Simple fracture of the femur near its middle. The fracture was treated by a surgeon in Antwerp, Belgium.

Thirty years after I could not find any traces of the accident.

CASE 45. *Simple fracture. Result perfect.*

—— Madison, of Buffalo, æt. 3. May 2, 1849, he broke his femur near its middle. Dr. S., of Buffalo, was called, and on the same day I met him in consultation. We dressed the limb with a roller carefully applied from the toes upwards, and laid it over a double inclined plane made of pillows.

One year from this date I found the limb sound and perfect.

CASE 46. *Simple fracture. Exact result unknown.*

Isaac Fridenburgh, æt. 5, was hanging on to the back of a wagon, July 3, 1845, when his right leg caught in the wheel and broke the femur a little below its middle.

I found the fracture nearly transverse. I applied a roller to the foot and leg, and scultetus bandage to the thigh, employing a sock gaitre for extension. The limb was secured in place by my long straight splint.

The next day his family physician, Dr. W., took charge of him, and I only know of the result that he recovered with a useful limb, and that he walks without any halt.

CASE 47. *Simple fracture. Result imperfect.*

Margaret Hamilton, æt. 8, was admitted to the hospital of the Sisters of Charity, Dec. 18, 1856. On the same day she had had her right thigh broken near its middle, by having fallen under the wheel of a wagon upon which was a small load of wood. The skin was much bruised at the seat of fracture, and the whole thigh was considerably swollen. It was evident also that one wheel had traversed the leg of the same extremity, a little above the ankle, as it was also swollen and the skin showed marks of violence.

I dressed the limb carefully with my double straight splint, con-

structed for children, making extension with adhesive straps and a screw.

Jan. 15, four weeks after the fracture had occurred, the fragments were well united, but with an overlapping of half an inch. During the whole course of the treatment I personally inspected the dressings every day, and almost daily they were readjusted and made snug. No excoriations occurred during this time, except a slight abrasion in the perineum.

On the sixth week she began to use crutches.

CASE 48. *Simple fracture. Result imperfect.*

E. S. King, of Buffalo, æt. 19, was thrown from a sleigh Dec. 5, 1854, breaking his left femur a little below its middle. Fracture simple and oblique. By request of his family physician, I took charge of the case.

Assisted by Dr. John Boardman, I applied a straight splint, with adhesive plaster extension, and with side splints.

Jan. 6, 1855, five weeks from the time of fracture, I removed the long splint. The fragments were united, and with some overlapping, but the line of the bone seemed perfectly straight; the bone could at this time be distinctly felt.

On the 15th, six weeks after the fracture, Dr. Howell being present, it was again noticed that the line of the bone seemed perfectly straight, although the limb was shortened one-half or three-quarters of an inch. Again, on the 25th, Dr. Nelson and myself made the same observation.

About this time he left his bed, and one year after I found the limb considerably bent outwards at the seat of fracture.

Whether this limb was so much bent when I examined it on the 15th and 25th, and the bending could not be traced owing to the presence of some swelling and temporary callus, or whether it occurred when he began to walk, I cannot say; I think, however, there was too little swelling immediately after the dressings were removed to have concealed the present deformity; indeed, both Dr. Nelson and myself feel quite certain that the bending must have taken place subsequently, but I do not feel warranted in affirming positively that such was the fact.

CASE 49. *Simple fracture. Result imperfect.*

Joseph Gallmeyer, æt. 9. Aug. 15, 1854, he fell from a tree, a height of about eight feet, breaking his right femur. The blow

was received upon the outside of the femur. Fracture simple. The hospital record does not show in what part of the limb the fracture occurred, but I think it was in the middle third.

He was carried immediately to the Buffalo Hospital. Dr. S. in attendance. A modification of Gibson's splint was employed.

Oct. 1, forty-six days after the accident occurred, I found the bone united, and shortened half an inch. We removed all dressings immediately, and on the 6th of Oct. he left the hospital.

CASE 50. *Simple fracture. Result imperfect.*

Samuel Logan, æt. 18, was struck by the boom of a vessel, breaking the left femur near its middle. Fracture simple.

He was carried to the Marine Hospital at Buffalo on the day following, Nov. 14, 1855. The limb was dressed by Dr. W., marine surgeon, and myself. We applied a straight splint, using adhesive plaster for extension. No side splints for several days. On the twenty-third day the fragments were partially united.

Dec. 13. Bony union complete. Limb shortened three-quarters of an inch. Does not limp at all.

CASE 51. *Simple Fracture. Result imperfect.*

George Hanson, of Buffalo, æt. 10. George was thrown down on the sidewalk by another boy, the boy falling also upon his thigh, and breaking it near the lower end of the middle third.

Assisted by Dr. F., who was at first called, but who had requested me to take charge of the case, I applied my own straight splint, with suitable side splints, &c. We used adhesive plaster for making extension.

Four weeks after I found the bone united, and shortened half an inch; the overlapping of the fragments being very perceptible to the touch. The limb was straight.

April 14, 1856, six weeks after it was broken, he walked on the leg, and on the first of May I saw him walking with only a slight halt.

CASE 52. *Simple fracture. Result imperfect.*

Philip Kneck, æt. 12. Simple fracture of the left femur a little above its middle, occasioned by the fall of some heavy boards upon his thigh, Sept. 13, 1855.

I applied immediately my own straight splint, with side splints, using adhesive plaster for extension. At the end of five weeks, I

found the bone firmly united and straight, but with an overlapping of half an inch. He does not limp.

CASE 53. *Simple fracture. Result imperfect.*

Frederick Frank, æt. 11. Fracture of the right femur near its middle. Simple. He was admitted into the Buffalo Hospital, April 16, 1853, eleven weeks after the fracture had occurred.

Dr. J., of Buffalo, had taken charge of the limb, and had employed in its treatment a straight splint. The bone was firmly united and straight, but it was shortened half an inch.

CASE 54. *Simple fracture. Result imperfect.*

James Farland, æt. 6. James fell from a loaded wagon, Sept. 18, 1853, and, after reaching the ground, a stick of wood fell upon his right thigh, breaking it below the middle. He did not come under my care until Oct. 1st, thirteen days after the accident. I found the thigh then dressed with Gibson's splint, shortened three-quarters of an inch, and not united.

Oct. 2, I substituted my own splint for Gibson's, and made extension and counter-extension with a perineal band and adhesive plasters, using also side splints, rollers, junks, &c. &c.

Oct. 18, I found the bone united.

Oct. 26, I removed all dressings. Limb shortened one-quarter of an inch, and slightly bent forwards and outwards at the point of fracture.

After a few days, he was dismissed from the hospital, cured.

CASE 55. *Simple fracture. Result imperfect.*

Pat. Mahoney, æt. 22. Simple fracture near the middle of the right thigh. Dr. P., of Buffalo, employed.

Nov. 1, 1852, eight weeks after the fracture had occurred, I found the fragments united, with a shortening of two inches. The limb was also much bent outwards at the seat of fracture.

CASE 56. *Simple fracture. Result imperfect.*

Francis Brodie, æt. 36. Admitted to the Buffalo Hospital, Jan. 5, 1853. Four months before admission his thigh had been broken near its middle. Dr. J. was employed as surgeon. It was treated with a straight splint. Brodie says he was visited by Dr. Jackson six times.

The limb is straight, but shortened, by overlapping, one inch.

CASE 57. *Simple fracture. Result imperfect.*

Graves Simcoe Lee, of Westminster, C. W., æt. 22, fell, in wrestling, and fractured his right femur through its middle third, June 12th, 1851. Dr. M., of Buffalo, was called, and on the following day, I was associated with him. We dressed the limb with a straight, and side splints, making extension by means of a paste gaitre and the worm screw.

The fragments were firmly united in about four weeks, and with a shortening of half an inch.

CASE 58. *Simple fracture. Result imperfect.*

Ernest Sieffert, of Buffalo, æt. 8, fractured his left femur near its middle. Dr. S., of Buffalo, treated it with a double inclined plane.

Five years after the accident occurred, I found it shortened half an inch.

CASE 59. *Simple fracture. Result imperfect.*

Isaac Smith, æt. 5. I saw this lad but once, Aug. 29, 1855. He was then lying in a canal boat. His left thigh had been broken eleven days by a fall from a horse. The fracture was simple and near the middle of the bone. It had been dressed with four short, side splints, by Dr. G., of Little Falls. Everything was now loose. The limb was shortened three-quarters of an inch, and slightly bent. The toes were everted. The fragments were so firmly united that I could not, with a moderate application of force, move them.

Assisted by Dr. Boardman, I applied a double straight splint (Hagedorne's). I could not lengthen the limb. I have never seen it since.

CASE 60. *Simple fracture. Result imperfect.*

G. W. Hayward, of Pittsburg, Pa., aged about 40 years, while intoxicated was thrown from a loaded wagon, breaking his left femur near its middle. Fracture simple and oblique. This occurred June 21, 1849, and on the same day he was carried to the Buffalo Hospital of the Sisters of Charity. We immediately applied the starch bandage to his leg and foot, and seven days later we commenced extension with the straight splint.

The usual lateral splints were applied to the thigh; starch was also used freely in the dressings about this part of the limb, so that the bandages held firmly to the limb, the splints to the bandage,

and the roller to the splints, and the dressings did not require re-adjustment for three weeks.

Three weeks after the fracture occurred, the dressings and extending apparatus were all removed. Bone united; shortened half an inch; straight. No ulceration of heel or instep.

Limb re-dressed with double inclined plane. This man finally left abruptly, and I had no opportunity of again measuring the limb.

CASE 61. *Simple fracture. Result imperfect.*

Almon Lathrop, of New York, æt. 22, broke his right femur near its middle. Simple.

He was treated by the surgeons of the New York City Hospital, with a straight splint and adhesive plaster extension.

I examined the limb, June 30, 1852, nine weeks after the fracture had occurred. The fragments were then united, and the limb was shortened three-quarters of an inch.

CASE 62. *Simple fracture. Result imperfect.*

A. Scheneiderbunger, of Baiarn, Germany, æt. 13, fractured his —— thigh near its middle. The fracture was simple. A surgeon in Baiarn took charge of the limb.

Nineteen years after the accident, he was an inmate of the Buffalo Hospital. He walked without the slightest halt, and assured us that the limb was not shortened; but, on measurement, I found it shortened one inch and a quarter. Drs. Vandeventer and Stewart, with myself, repeated the measurement several times, and always with the same result. The lower part of the spinal column was tilted to one side.

CASE 63. *Simple fracture. Result imperfect.*

Michael Hallis, æt. 15, fractured his left thigh near its middle. Fracture oblique and simple. Dr. V., of Pittstown, in attendance.

Sept. 14, 1851, I examined the limb; nineteen years after the accident. I found the thigh shortened half an inch, and the hip of the same side lame.

CASE 64. *Simple fracture. Result imperfect.*

Hiram Clark, fractured his left femur when 16 years old, near its middle. A surgeon residing at Little Falls, N. Y., was employed.

I examined the limb twenty-five years after the accident occurred,

and found it shortened three-quarters of an inch. He did not limp in the least when he walked, and was uncertain, until my measurement, repeated three or four times, had determined it, which leg was broken.

CASE 65. *Simple fracture. Result imperfect.*

John Rayner, aged about 30 years, had his left thigh broken near its middle, while serving as a United States soldier. It was treated by an army surgeon. Five years after I found the thigh shortened one inch and a half.

CASE 66. *Simple fracture. Result imperfect.*

Michael Heindel, æt. 25, fell from a railroad car when it was in motion, breaking his left femur a little above its middle.

Dr. H., of Buffalo, had charge of the limb during the first fortnight, and subsequently both Drs. S. and H., were in attendance. They applied a straight splint, and this was removed after about five or six weeks. As soon as the splints were removed, his limb began to swell, and to become more painful. The knee was especially painful and stiff.

Seventeen weeks after the accident he called upon me, complaining of his surgeons, and asking whether the condition of his limb could be improved.

The knee was partially anchylosed. The thigh was shortened three-quarters of an inch, the upper fragment riding upon the inside of the lower.

I recommended to him free motion and use of the limb, predicting that he would probably be able to walk without any lameness within six months or a year from that time.

CASE 67. *Simple fracture. Result imperfect.*

Feb. 13, 1851, David Consaul, of Buffalo, æt. 30, fell about seventeen feet and struck upon his side, breaking his left femur near the middle.

Drs. N. and W., of Buffalo, in attendance. During the first twelve days the limb was treated without splints, being only supported with pillows, bolsters, &c. The thigh, and especially the knee, were very much swollen.

On the twelfth day the limb was laid over a double inclined plane made of boards, and movable at the knee-joint, to which also a foot-

board was attached. The foot was secured to the footboard and the thigh inclosed in side splints.

These dressings were continued nine weeks and four days, being daily seen by one or the other of the surgeons, and occasionally renewed.

When the splints were finally removed, Mr. Consaul noticed a "callus."

One year after, Mr. Consaul called upon me to obtain advice as to the propriety of his prosecuting his surgeons.

I found the limb shortened three-quarters of an inch, and somewhat bent outwards at the seat of fracture. The leg is occasionally painful, and not as strong as before. His knee especially "gives out" when he walks.

CASE 68. *Simple fracture. Result imperfect.*

John Laughton, æt. 7, admitted to the Buffalo Hospital, Jan. 26, 1853, with a fracture of the femur near its middle. He had fallen, January 12th, from a ladder, a height of nine feet. Dr. W., of Buffalo, dressed the limb with Gibson's splint.

I substituted for Gibson's splint, my own, and covered the foot and leg with a paste bandage, making extension with adhesive straps.

On the thirty-ninth day the union was firm, and I removed all dressings on the forty-fifth day. The limb was then shortened half an inch, but straight. The overlapping of the fragments felt like ensheathing callus.

CASE 69. *Simple, nearly transverse fracture. Result imperfect.*

In Dec., 1843, W. T., a house joiner, was employed shingling the roof of a railroad depot, when he fell and fractured the right femur about its middle. T. was about 40 years old. The fracture was nearly transverse.

Dr. W., of Buffalo, was called, and applied Sir Astley Cooper's double inclined plane, having previously covered the leg with a roller, and secured lateral splints to the thigh.

At the end of six weeks the dressings were finally removed, the fragments being united firmly.

Subsequently T. claimed damages for malpractice in the treatment of the leg, and Dr. W. was sued and the case was tried in the Erie County Supreme Court, first in 1844, and again in June, 1845. In neither of these trials were the jury able to agree. Finally, in

June, 1848, it was tried in the same court, Justice James G. Hoyt presiding. Eli Cook, for plaintiff; J. G. Masten, S. G. Haven, and James Shelden, for defence.

The limb is now shortened one inch, and considerably bent or bowed forwards at the seat of fracture. Drs. Trowbridge, Barnes, and Burwell, witnesses on the part of the prosecution, thought it a "medium cure." Dr. Sprague did not think so. Dr. Flint, on the part of the defence, thought it an average cure. I thought it nearly, but not quite, an average cure.

The plaintiff claimed that the bend and shortening resulted from the use of a double inclined plane, and from negligence in its use; and that it occurred while the limb was in the splint. The defendant replying that it came out of the splint straight, and that the deformity now present took place after his responsibility had ceased.

Dr. Trowbridge said that "more or less deformity usually follows a fracture of the thigh bone, even in the best cases."

Dr. B. Burwell said "it was a difficult bone to heal, and to make straight."

Dr. Austin Flint said "fracture of the thigh-bone is one of the most difficult to treat, perhaps the most so."

Dr. Willard Parker said, "in children you may generally get union without shortening; in a well, active man you may not; it depends upon the power of the muscles."

The cause was submitted to the jury June 30, and the Judge charged the jury, as to the points of law, stating that if they were satisfied that the defendant had exercised ordinary skill, and ordinary care, they were to find for him. He then went into a general review of the testimony; stating also that in cases like these the medical testimony should have more weight in matters of opinion than the testimony of other witnesses, as they were, it is to be supposed, better informed upon subjects of the nature here presented.

The jury conferred with each other a few minutes, and returned a verdict for the defendant.

CASE 70. *Simple fracture. Consolidation of the callus delayed. Result imperfect.*

Charles Henry Martin, æt. 8, fell and broke his left femur, Dec. 26, 1851. Dr. N. was called, and dressed the limb with Desault's splint. On the third day after the accident I was requested to visit the patient with Dr. N.

We dressed the limb carefully with side splints, and with Desault's straight splint, making all proper extension.

He was left in charge of Dr. N., and the long splint was continued six weeks, but he did not begin to walk, with crutches, until six weeks later. He used crutches about three or four weeks, and then for the first time walked by bearing his whole weight upon the limb. The father says he limped from the time he began to walk, and that there was a large "callus" about the fracture.

Six months after it was broken, and full four months after he began to walk, it was noticed that the limb was bending, and on the 22d of August, 1852, when the child was brought to me, the thigh was very much bent outwards at the seat of fracture. There was no pain or soreness at this point, and his health was good. The father says that the change in the form of the limb was such that he could notice it from week to week; that this change seemed to him to have been going on about six weeks, and that he knows no cause for it.

I advised a resort to splints, but the patient refused absolutely to have them applied. Three months from the date of this examination, the lad was brought to me again (Dec. 1, 1852). No treatment had been adopted. The boy had continued to run about as usual. The bending had ceased spontaneously, and, indeed, the bone seemed to have become a little straighter.

CASE 71. *Simple fracture. Broken twice in the same place, at different periods. Result imperfect.*

John Gordon, of Rochester, æt. 8, broke his thigh near its middle. Dr. D., of Rochester, took charge of the limb.

It was again broken when he was 14 years old at the same point. Dr. T., of Rochester, was employed. Both surgeons used the straight splint.

Sept., 1851, sixteen years after the last fracture, I found the limb shortened half an inch.

CASE 72. *Simple fracture. Union delayed. Result imperfect.*

Jacob Turinger, of Lancaster, N. Y., æt. 14, fell from a tree, breaking his left thigh near its middle.

Dr. P., of Lancaster, was employed. He applied a straight splint, with extension and counter-extension. He was unable to prevent the fragments from overlapping by any amount of extension which he could employ; and, as the sharp point of the upper

fragment projected considerably, he did not, for some time, dare to apply lateral splints, and to this fact, Dr. Potter attributes the delay in union.

Eleven weeks after the fracture had occurred, Dec. 13, 1848, he was admitted to the Buffalo Hospital. The fragments were not united, and the limb was shortened three-quarters of an inch. He says they have been united imperfectly, and that the re-fracture was produced by sitting on the edge of the bed.

I applied my own straight splint, with also side splints. Fourteen days from this time, the union of the fragments was accomplished, and, as the foot had appeared swollen for some days, I removed the straight splint, and continued only the side splints.

Jan. 3, all dressings were removed, and on the 10th he was discharged with the limb straight, but shortened three-quarters of an inch.

CASE 73. *Simple fracture. Consolidation of callus delayed. Bone accidentally re-fractured. Result imperfect.*

Joseph McEllicott, æt. 22, was crushed under a bank of earth, Oct. 27, 1850, breaking his right femur near its middle; also his lower jaw and both bones of his left leg. The fracture of the thigh was simple and oblique.

Dr. J., of Waverly, was employed. He applied two long splints, &c.

Jan. 28, three months after the fracture occurred, he was admitted into the Buffalo Hospital. The right thigh was united, but very much bent at the seat of fracture, and shortened three inches or more. There was an ulcer under the heel of the right foot. The whole limb was swollen. An abscess existed in the left leg, and an ulcer under the left heel. Patient was quite feeble. Before the accident, he had enjoyed excellent health, with the exception that he had, at the time of the fracture, intermittent fever.

I laid a bladder filled with water under each heel, and suspended the limbs in a swinging fracture apparatus. The legs were ordered to be bathed in cold water twice daily.

On the 13th of February, phlegmonous erysipelas attacked the left leg, which was arrested under a tonic and stimulating treatment, after several days.

On the morning of the 17th of Feb., I found the fragments again separated: they having been re-fractured by an attempt to turn in bed. On the 19th, I applied a starch bandage and straight splint

to the right leg and thigh, with extension, &c. On the 24th, I noticed that the limb seemed straight. March 29th, I removed the dressings, and found the limb united; it was now nearly six weeks since it had been re-fractured, and five months since it was first broken.

After being confined in the hospital several months longer, he began to walk, and finally recovered, with a shortening in his right thigh of three inches. At no time while he was an inmate of the hospital could we extend the limb beyond this.

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CASES 47 AND 75. *Simple fracture in left femur, and comminuted in right. Union delayed in latter case. Result imperfect.*

Joseph Powers, of Clyde, N. Y., æt. 23, was at work in a steam mill connected with a saw mill, when he was caught by the pump belt, and drawn over the main shaft. The belt, falling over his shoulders and neck, lashed him fast, and carried him over, it is estimated, one hundred and fifty times, the shaft making this number of revolutions in a minute. At each revolution he passed within one foot of the ground.

The left femur was broken near its middle. The right femur was broken near its middle and in its lower third. The left humerus was also broken, and the radius dislocated forwards at the elbow.

Dr. ——, of Clyde, was in attendance. The radius was reduced immediately, and the humerus dressed with suitable splints. The patient was conscious, but the muscles offered no resistance, being completely paralyzed by the injury; and by the application of only moderate force, the broken femurs were brought into exact position. The severity of the injury, however, was such as, at first, scarcely to encourage a hope that the patient would recover, and no splints or other mechanical appliances were employed upon the lower extremities during several days. They were subsequently secured to a double inclined plane, but it was now found impossible again to reduce the fragments.

Four months after the accident, I was called to see him. The left femur had then united, but it was shortened two inches, and bent forwards at the seat of fracture. The right femur had united in its lower third, but no union had occurred in its middle. I rubbed the ends violently together, and then, having secured the limb in a straight splint, with as much extension as he could bear safely, with also side splints snugly laid against the limb, I left him in charge of his surgeon.

I observed that no amount of extension would enable us for one moment to extend the limb more than half an inch, and that this could not be retained by any force which might be safely continued.

Three months later, Mr. Powers called upon me at my office, bony union having been completed within one month from the time I saw him. He was now walking without aids, and his height was two inches less than before the accident.

CASES 76 AND 77. *Simple fracture in left femur, and comminuted fracture in right. Limbs crooked soon after recovery, but eventually becoming straight.*

Hume, æt. 4, of Buffalo. Both of her thighs were broken April 8, 1847, by the passing over them of a wagon loaded with a cord of wood. The left femur was broken a little above its middle, and the right femur was broken at the same point, and also lower down, but in the middle third. Considerable swelling immediately followed the accident.

I dressed the legs with side splints, and laid them over a double inclined plane of boards, covered with a cotton mattress. During the whole treatment I experienced great difficulty in retaining the limbs in place, and when, at the end of three weeks, union had occurred, I found both thighs were bent forwards at the seat of fracture. Whether they were overlapped or not it was impossible to ascertain.

Five years from this time the seat of fracture could not be felt, and both thighs were straight or of a natural form. The straightening had occurred spontaneously.

CASE 78. *Simple fracture. Preceded by mollities ossium. Result imperfect.*

A. M. Bartholomew, of Buffalo, æt. 41; until 31 years old enjoying good health, and with no scrofulous or other constitutional taint.

Mr. B. is a coppersmith, and stands most of his time, and is accustomed to lift weights considerably. During the last ten years he has not been so well; his strength and appetite having in some measure failed. He feels especially weak after dinner. A year before the fracture he noticed that his right leg was especially weak, and that the thigh was becoming bent. In 1844, when 29 years old, a large dog ran against this thigh, breaking it instantly. Dr. Terry treated the fracture, employing a straight splint, without side

splints. In seven weeks union was complete, but it was several months before he was able to use the limb much.

Nineteen months after this fracture, Bartholomew consulted me in relation to a bending of his left leg, which had been progressing three or four years. I found it much bent, weak, tender, but not painful. The right leg had not bent any since the fracture. It was shortened one inch, and it was much the best leg of the two.

CASE 79. *Simple fracture complicated with fracture of the patella in the same limb. Result imperfect.*

Wm. Palmerston, of Black Rock, Erie Co., N. Y., aged about 25 years, fell, Dec. 27, 1853, and broke his left thigh near the upper end of its middle third. The patella of the same leg was broken at the same time. Dr. L., of Black Rock, was in attendance. I saw the patient with Dr. L. on the fifth day.

For the fracture of the femur we used a single long straight splint, with adhesive plaster extension, and side splints.

The femur has united with a shortening of half an inch. (See Fractures of the Patella.)

CASE 80. *Simple, oblique fracture in a paralyzed limb. Result probably perfect, but somewhat uncertain.*

Willis Sawens, of Albion, Orleans Co., N. Y., æt. 14, broke his right femur near its middle, by a fall from a horse. Direction of fracture obliquely downwards and outwards.

When only eight months old, after a severe illness, this limb was paralyzed, and had since become gradually much emaciated. It was also two or three inches shorter than the other at the time of the fracture.

Within three or four hours after the accident, before the limb was much swollen, it was reduced by Dr. H., of Paris Centre. Very little swelling ever occurred. Two men reduced it, using, as Mr. Sawen thinks, considerable force. The fracture was dressed with a roller applied the whole length of the limb, and a side splint of about seven inches in length, made of basswood, which, having been planed sufficiently thin, was steamed and bent around the leg so as to fit accurately. Between the splint and roller was placed a wide compress. The splint was secured with strings. The limb was then laid over a double inclined plane made of pillows.

He was kept in bed three months, and the lateral splint was not removed until after four months and a half.

CASE 81. *Compound fracture. Result imperfect.*

John Street, of Buffalo, æt. 18, was injured by the fall of a bar of iron upon his right thigh, breaking it near its middle. One of the fragments was pushed through the skin.

On the same day, he was admitted to the Hospital of the Sisters of Charity. I applied a Potter's straight splint, and made extension with adhesive straps, &c.

The wound in the flesh healed promptly, and the bone united in the usual time. The extension was discontinued at the end of six weeks.

He left the hospital ten weeks after admission with a shortening of the thigh of one inch and a quarter. The limb was strong, and the halt scarcely perceptible. I think the unusual shortening was due to the fact that the bone had penetrated, and, by wounding the muscles, had caused them to contract.

CASE 82. *Compound fracture. Result imperfect.*

George Schaeffer, æt. 8, was admitted to the Buffalo Hospital of the Sisters of Charity, Jan. 30, 1857. On the same day, a sleigh, loaded with a cord of wood, had passed over his left thigh near its middle. Dr. Hugh B. Vandeventer, of Buffalo, was immediately in attendance, and found one fragment of the femur projecting through a wound on the outside of the thigh, and the other fragment protruding on the inner side. Dr. V. reduced the fracture and dressed the limb temporarily, and then sent him to the hospital.

I found the thigh greatly swollen, and much lacerated and bruised. In this condition, it was impossible, or, at least, quite unsafe, to make extension. The only hope of saving the limb seemed to be in giving it a careful and gentle lateral support. I dressed the wounds, therefore, with simple cerate, and enveloped the thigh in gutta percha splints, well padded, and secured in place by tapes. The whole limb was then laid upon its outside, with the knee slightly flexed, after the manner of Pott.

Gradually, large portions of skin sloughed away, and then healed. The swelling steadily subsided.

Four weeks after the fracture occurred, bony union was complete, with a shortening of one inch. Until this day, the wounds were not sufficiently healed to allow of extension. Dr. John Boardman,

hospital surgeon, now applied moderate extension with a straight splint, but it proved painful and useless, and was soon discontinued.

CASE 83. *Compound fracture from a gunshot wound. Result nearly perfect.*

A. B., æt. 24. This gentleman was shot, June 7, 1855, through both thighs. The bullet, discharged at ten paces from a large dueling pistol, entered the right thigh eight inches above the knee, passing a little obliquely downwards and inwards, in front of the bone, and then entering the left thigh perhaps one inch lower down and half an inch further back, so as to strike and fracture the left femur near the upper end of its lower third. The bullet buried itself in the left thigh and has never been found. A portion of the pantaloons and drawers entered with the bullet, and were drawn out before my arrival. Rollers were applied moderately firm, and cold water dressings directed; absolute rest was also enjoined.

This plan was pursued until the eighth day after the fracture. The bullet had passed in such close proximity to the femoral artery in both thighs, that it was thought most prudent, so long as there was no muscular spasms and very little displacement, to withhold the application of splints. Indeed we were in constant apprehension that a dangerous hemorrhage would occur.

On the second day the thigh and leg of the broken limb were very much swollen; he was suffering with a dull, heavy pain in his thigh, and especially behind the knee; his sleep was disturbed; his pulse 120, and wiry.

These symptoms gradually disappeared, and on the eighth day, June 15, I applied my own straight splint, with adhesive plaster extension. At this time the swelling had greatly subsided, but there was extensive discoloration of the limb from bloody effusion. The wounds were beginning to suppurate.

Aug. 1, eight weeks after the fracture, we removed the large splint and found the bone united with the line of the limb perfect, but with an overlapping of half an inch. He remained in bed one week longer, when, the wounds having been for some time completely closed, he was permitted to get upon crutches.

He now walks without the smallest amount of halt, and the limb is in all respects as useful as before. This result, so unexpected in a case where so many complications were presented, was due in no small degree to the remarkable firmness and composure of the patient, as well as to the care and skill of Dr. W., of Niagara

Falls, and Dr. C., of New York, the first of whom was in constant attendance throughout the whole course of the treatment.

CASE 84. *Comminuted fracture. Result imperfect.*

John Rayner, a discharged Florida soldier, aged about 35 years, was lying upon his back between the rails of the Syracuse and Auburn Railroad, when the train passed over him, the fire pan striking the knee of his right leg as it was drawn up, and breaking it in two places; one fracture being through the middle, and one through the lower third of the femur.

I dressed the fracture on the same day, with side splints and Bowen's double inclined plane, called also the "navy" splint. The left thigh had been broken in Florida, and had united with a shortening of about one and a half inch. (See Case 65.)

The accident occurred in the fall of 1839, and union took place in the usual time, but with a shortening of about two inches, and the fragments remaining slightly bent forwards at the seat of fracture. This shortening and bend I found it impossible to prevent, the limb being greatly swollen for many days, and not admitting of any degree of extension.

CASE 85. *Compound comminuted fracture. Result imperfect.*

J. A. Burrows, æt. 14, fell fifty feet, striking upon his knee, and fracturing his left femur through its middle. Fracture compound and comminuted.

Dr. D., of Penfield, Monroe Co., N. Y., was employed, and laid the limb upon a double inclined plane.

He did not use the leg for more than a year. About eighteen months after it had been broken, a small piece of bone escaped through a fistulous opening. Seventeen years after the accident, while he was a student of medicine, I examined the thigh, and found it firm, but shortened one inch. The whole limb is atrophied, but he walks without scarcely any limping.

CASE 86. *Compound comminuted fracture.* (*Gunshot fracture.*) *Result imperfect.*

Pat. Haney, of Livingston Co., N. Y., æt. 23, had his thigh broken near its middle, by a bullet, while he was serving as a private soldier in the English army. He was treated by an army surgeon.

Thirty-eight years after, when I saw him in the Livingston

County Alms-House, N. Y., the thigh was shortened one inch and a quarter, but the limb was quite useful.

Lower Third.

Remote from Condyles.

CASE 87. *Simple fracture. Result perfect.*

James Bryan, of Buffalo, æt. 8, fractured his — femur, at the upper end of the lower third, Jan. 20, 1849. Fracture simple. He was admitted to the Buffalo Hospital on the next day.

Jan. 23d, we applied the starch bandage to his foot and leg.

Jan. 28th, seven days after the occurrence of the fracture, extension and counter-extension were made with a straight splint, and lateral splints were also applied.

This treatment was continued until the 17th of February, a period of twenty days, and extending to twenty-seven days after the fracture, during which time the little patient made no complaint, but was always cheerful and happy.

On the 17th of February, the bandages and splints were removed. The bone had united with proper length and direction. There was not even discoloration or tenderness about the ankle or leg.

CASE 88. *Simple transverse fracture. Result perfect.*

Aug. 13, 1847, Harris, a lad 3 years old, fell from a ladder, breaking his left thigh near the upper end of the lower third. I think the fracture was transverse. Assisted by Dr. K., of Buffalo, I dressed the limb a few hours after the accident.

We applied lateral splints, made of felt, and then laid the whole limb over a double inclined plane.

On the fifth day, I re-dressed the fracture, and found everything in place.

On the thirteenth day, the limb was bent and overlapped. Finding that the fragments had not united, I immediately substituted a simple straight splint, such as I usually employ for children, making, at the same time, as much extension as he would bear.

One year after, the limb was straight, nor was there any perceptible shortening.

CASE 89. *Simple fracture. Result imperfect.*

Abram Miller, of Steuben Co., æt. 24, fractured his right femur through its lower third. Fracture simple.

Dr. W., of Wyoming, N. Y., was employed. The limb was dressed with side splints, and laid over a double inclined plane.

Thirty years after the accident, I found the thigh shortened one inch and three-quarters; yet he walked with only a very slight halt.

CASE 90. *Simple fracture. Result imperfect.*

Elisha Standish, æt. 42, fractured his thigh through its lower third. A surgeon, in Livingston Co., N. Y., whose name he has forgotten, dressed and took charge of the limb.

Five years after the accident had occurred, I found him an inmate of the Livingston County Almshouse. His thigh was shortened one inch.

CASE 91. *Simple fracture. Result imperfect.*

H. Hogan, of New York, æt. 42, fractured his — femur through its lower third.

It was treated at Bellevue Hospital, N. Y., with a straight splint, and with adhesive plaster extension.

I examined the limb seven weeks after the fracture had occurred, and found it shortened half an inch.

CASE 92. *Simple fracture. Result imperfect.*

Henry Dugan, Buffalo, æt. 11. Fracture of right femur about three or four inches above the knee-joint. Simple. Occasioned by being tripped in wrestling, and falling with his legs spread asunder.

The limb was immediately dressed by Drs. L. and B.; and on the same or following day, Feb. 5, 1853, he was carried to the hospital. I found the limb inclosed very neatly, in long splints made of binders' board, carefully moulded to the limb and secured in place with a roller extending from the toes upwards. In order that I might examine the fracture I removed these dressings. I now dressed the limb carefully myself with first a paste bandage, extending from the toes to above the knee. I then applied lateral splints to the thigh and a long splint for extension. Extension was made with adhesive straps. Great care was taken in the dressings, and when they were completed the two limbs were of the same length. I measured with a tape line.

March 5th, I removed the splint. The fragments were united,

but with a shortening of three-quarters of an inch. The upper fragment overlapping and lying upon the outside of the lower. This result has happened notwithstanding I took unusual care, throughout the treatment, to keep up the extension, and notwithstanding the patient was in every way submissive.

CASE 93. *Simple fracture. Result imperfect.*

Sarah Sullivan, æt. 27, admitted to the Buffalo Hospital, March 9, 1851, with a fracture of the right femur, near the upper end of the lower third. The limb had not been dressed.

I ordered a paste gaiter to be applied to her foot and leg, and on the 10th the house surgeon applied the long thigh splint with extension and counter-extension; also the usual lateral splints.

Union occurred in about five weeks, with a shortening of three-quarters of an inch. Mrs. Sullivan was a feeble woman, and did not bear confinement well. At several times we found she had loosened her bandages herself.

CASE 94. *Simple fracture. Result imperfect.*

Alonzo Benedict, of Buffalo, æt. 10, was run over by a wagon loaded with lumber, Sept. 24, 1852, breaking his — femur at the upper end of the lower third. I could bend the limb at the point of fracture, with great freedom, yet I could not produce crepitus. I was unable to determine at first whether it was not broken also at a point lower down. I now think it was not.

I applied my double, long splint, making extension with adhesive plasters, and confining the whole length of the limb very snugly to the long splint. At first, and for several days, I used no small side splints upon the thigh. When the dressings were applied I measured the limbs and found them of the same length.

Oct. 22, four weeks after the occurrence of the fracture, I removed the apparatus, and found the fragments united with a shortening of one-quarter of an inch. There was also a slight forward projection at the seat of fracture.

Sept. 15, 1856. He walks without any halt, and has never suffered any inconvenience from the limb.

CASE 95. *Simple fracture. Result imperfect.*

Lyttle, æt. 20. Femur broken four inches above the knee, obliquely, by the fall of a bank of earth.

Five hours after, when I dressed the fracture, it was much swollen.

I restored the fragments, as completely as possible, with pulleys, and then applied Gibson's splint; allowing the pulleys to remain for a few days.

March, 1837, three months after the accident, he was walking without any perceptible halt. The limb was, however, shortened half an inch.

CASE 96. *Simple fracture. Result imperfect.*

Feb. 28, 1846, John Burscough, aged about 25 years, a very muscular and fat butcher, was thrown from his sleigh and broke his thigh at the upper end of the lower third. Dr. M. and myself in attendance.

We placed him temporarily on a double inclined plane, having no straight splint at hand. On the following day we applied the straight splint. At the end of four weeks we loosened the extension and found an ulcer on the heel. The bones were not united. At the end of six weeks we removed all extension. The bones were then united. The ulcer did not close under a month or two. The thigh was shortened half an inch.

CASE 97. *Simple fracture. Union delayed. Result unknown.*

Pat. McDonald, of Medina, N. Y., æt. 23. His left thigh was broken in its lower third by being traversed by a hand car.

He was at first seen by Drs. W., H., and F., of Medina. A splint was applied and extension employed, but on the fourth day it became so painful that the extension was discontinued. On the eighteenth day extension and counter-extension were again employed, and continued for some time.

Feb. 18, 1853, seven weeks after the fracture occurred, he was brought to the Buffalo Hospital. The fragments were still ununited. He was pale and feeble; leg and foot much swollen; excoriations about the thigh; a sloughing ulcer soon occurred upon the heel.

I did not apply any splints until March 9, having only employed, until this time, means to re-establish his health. I then applied a paste roller and splints of binders' board. He was directed also to get up on crutches.

About one month after admission I found the bones united, and, my record says, without any shortening, but I do not know by whom the measurement and record were made.

CASE 98. *Simple fracture, complicated with a fracture of the tibia and fibula in the same leg. Result imperfect.*

Thomas Dolanty, aged about 30 years. August 14, 1854, his leg and thigh were traversed by a loaded cart, breaking the thigh near the upper end of the lower third, and the leg about eight inches above the ankle; the latter accident was compound.

Assisted by Austin Flint, Jr., I dressed both fractures carefully, applying my own long splint. Extension, so far as we were able to make it, was effected through the aid of a paste gaiter.

On the tenth day Dr. B., one of the hospital surgeons, took charge of him at my request.

At the end of eight weeks the femur was united with an overlapping of three-quarters of an inch. It was perfectly straight. The leg united with a shortening of one-quarter of an inch.

CASE 99. *Compound fracture. Result imperfect.*

G. F., of B., Canada West, fell fifty-five feet, September 5, 1855, breaking his left thigh obliquely, near the upper end of the lower third. The fracture was compound. His elbow-joint was dislocated at the same time.

Mr. F. called upon me at Buffalo, I think in March, 1856, about six months after the accident had happened. He stated to me that he was 23 years old. That the limb was treated by Dr. ———, of B., C. W.; the limb was laid over a double inclined plane, and the thigh was supported with thigh splints: no means for permanent extension were employed; the limb was kept upon the splint seven weeks; two months after it was broken, and when it had united, Dr. ——— applied extension, and the fracture was reproduced. The thigh was now enveloped in a mould of plaster of Paris; this was removed at the end of one week; in three weeks more the fragments were again firmly united.

When I examined the limb it was united, but with a shortening of three inches; the foot and leg were slightly rotated outwards; an abundant callus surrounded the fracture, and a fistulous discharge still continued from the bone. His knee was stiff and his whole leg greatly swollen. He was unable to walk or stand.

CASE 100. *Comminuted fracture. Union with shortening.*

(Same as Case 75. Middle third.)

Just above Condyles.

CASE 101. *Simple fracture. Result imperfect.*

James A. Manley, æt. 4, fractured the right femur about two inches above the joint.

The limb was dressed, and subsequently treated, by a surgeon living in Hubbarton, Vermont.

Twenty-six years after the accident occurred, in July, 1853, I examined the leg. The point of fracture could not be felt, yet the thigh was shortened half an inch. He walked without any halt, and he was not aware that the limb was shortened.

CASE 102. *Simple fracture. Result imperfect.*

Wm. Hennen, æt. 25, was caught between a carriage and a tree, Feb. 13, 1854, breaking his left femur three and a half inches above the knee-joint. Dr. L. dressed the fracture ten hours after it occurred. He applied two long splints, one on each side of the thigh and leg, with rollers, &c. Extension was made by four men, before the splints were applied, but no extension was employed afterwards. The dressings were removed and the limb examined occasionally. The splints were continued six weeks.

June 21, 1854, Hennen called upon me. The limb was shortened one inch and a half or three-quarters; the lower end of the upper fragment lying in front and upon the outside of the lower. He walked with a halt. Motions of knee-joint free.

His object in calling upon me was to ascertain whether the limb had been properly treated, and whether it could not be broken over again.

CASE 103. *Simple fracture. Union delayed. Limb shortened.*

Andrew Carr, of New York, æt. 25, fractured his right femur about three inches above the joint, and was taken to the New York Hospital.

I examined his thigh, June 30, 1852, nearly five months after the fracture had occurred. The fragments were united, and the limb was shortened three-quarters of an inch. The fracture had been treated with a straight splint.

CASE 104. *Compound, comminuted fracture. Exfoliation of bone and great shortening.*

Daniel Welch, of Ireland, æt. 20, was crushed under a heavy

weight, breaking and comminuting his right femur just above the knee. Subsequently several pieces of bone came out.

June 30, 1851, five years after the accident, in presence of Drs. Pupikoffer, Boardman, and Nichols, I examined the limb. Welch told us at first that the limb was shortened three inches, but on careful and repeated measurements, we found it was shortened seven inches! To compensate for all this loss in the length of the limb, he had raised the heel of his shoe one inch, and now he walked with scarcely any perceptible halt. An examination of his back, however, furnished an easy solution of this seeming paradox. His spine was very much bent to the right in the lumbar region, so that constantly the right wing of his pelvis was four inches lower than the left, and when he bore his weight upon his right leg in walking, the right wing of his pelvis was six inches lower than the left.

CASE 105. *Simple fracture complicated with injury of the popliteal vessels and nerves. Gangrene of foot.*

George Taylor Aikin, of Lockport, N. Y., æt. 7. May 18, 1854, in jumping down a bank of about three feet in height, he broke the right thigh obliquely, just above the knee-joint. Direction of the fracture obliquely downwards and backwards.

Dr. G., an accomplished surgeon, residing in Lockport, was called. The limb was not then much swollen. He applied side splints, rollers, &c., carefully, and then laid the limb over a double inclined plane (Day's). The knee was elevated about six or eight inches. Before applying the splints, suitable extension had been made, and after completing the dressings the two limbs seemed to be of the same length.

These dressings were examined and readjusted daily. On about the seventh day the lad was complaining a good deal of pain, &c. He had all along been restless and had complained, at times, of pain in his leg and foot. Dr. G. now noticed, for the first time, that his toes looked unnaturally white, and that they were cold.

Counsel was now called at the request of Dr. G., when it was determined to abandon all dressings and direct their efforts solely to saving the limb.

The result has been that slowly a considerable portion of his foot died and sloughed away, leaving only the tarsal bones. The fracture united, but with considerable overlapping and deformity.

Feb. 26, 1856, the boy was brought to me by his father. His general appearance indicated delicacy. On examining the fracture I noticed that the anterior line of the bone seemed nearly straight, only bending back slightly about three inches above the joint, and this was owing in some degree to the covering of soft parts, and in some degree, also, to the manner in which the fragments rested upon each other: the pointed superior end of the lower fragment resting snugly upon the front of the upper fragment, so that no abrupt angle existed in front. On the back of the limb, however, the lower end of the upper fragment, quite pointed, projected freely downwards and backwards into the popliteal space, so that its extreme point was only about half an inch above the line of the articulation. The limb had shortened one inch, and this enabled us to determine accurately that the lower point of fracture in the bone was one inch and a half above the articulation.

The motions of the knee-joint were pretty free. The leg was extremely wasted, and the anterior half of the foot having sloughed off, the sores had now completely healed over. He was able to walk tolerably well without either crutch or cane.

Subsequently, Dr. G. found it necessary to sue the father of the child for the amount of his services, when Mr. Aikin put in a plea of malpractice, and that consequently the services were without value.

The case was tried in the March term of the Niagara circuit for 1856, at Lockport, the Hon. Benj. F. Greene presiding.

On the part of the defence it was claimed that the death of the foot was in consequence of the bandages being too tight. They failed, however, to show that they were extraordinarily or unduly tight. While on the part of Dr. G., the prosecutor, it was shown that the death of the toes was preceded by a loss of color, and that it was not accompanied with either venous or arterial congestion. The medical gentlemen examined as witnesses, declared that this circumstance furnished the most positive evidence which could be desired, that the death of the toes was not due to the tightness of the bandages, but that its cause must be looked for in an arrest of the arterial or nervous currents supplying the limb, or in both. They believed, also, that the projection of the superior fragment into the popliteal space was sufficient to cause this arrest. They also believed that this overlapping and consequent projection could not have been prevented in this case, and that, therefore, the treat-

ment was not responsible for this unfortunate result: indeed, they regarded the treatment as correct, and the result as a triumph of skill, in that any portion of the limb was saved; the leg and foot now remaining being far more useful than any artificial leg and foot could be.

The Hon. Judge, in a speech remarkable for its clearness and liberality, sought to impress upon the jury the value of the medical testimony. The jury returned a verdict for Dr. G., allowing the amount of his claim for services, with the costs of suit.

FEMUR.

UPPER THIRD (NECK).

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT.				Perfect or imperfect.
							United or not.	When united.	Amount of shortening.	Remarks.	
1	52 y.	3 m.	M.		Simple, probably within capsule	Straight splint 3 w, and then crutches.			1½ in		Imp.
2	77 y.	6 m.	M.	R.	Simple, within capsule	No dressings for 2 weeks, and then straight splint.	U. by lig.		3 in.	Fall on trochanter; did not shorten at first; no eversion or inversion of toes; no crepitus.	Imp.
3	78 y.	36 h.	M.		Simple	Double inclined plane at first; then straight splint.			1 in.	Fall on trochanter; eversion of toes; no crepitus.	Imp.
4	73 y.	29 d.	F.	R.	Simple, without capsule	No splint.			½ in	Fall on trochanter; eversion; no crepitus; unable to lie down for 3 months, and unable to walk for 1 year.	Imp
5	66 y.	1 m.	F.	R.	Simple, within capsule	Double inclined plane,			1 in.	No shortening at first; no crepitus; eversion.	Imp.
6	50 y.	5 y.	F	R.	Simple	No treatment, except confinement to bed.			1½ in	Fall on trochanter; eversion; bed-ridden after 5 years.	Imp.
7	84 y.	8 m.	F.	L.	Simple, probably without capsule	Confinement in bed.	U. by bone		½ in.	Fall on trochanter; eversion at first; unable to walk without crutches after 8 months.	Imp.
8	65 y.	6 m.	M.	L.	Simple	Gibson's straight splint.	U.		¾ in.	Blow on groin.	Imp.
9	79 y.	1 y.	F.	L.	Simple	Double inclined plane of pillows.				Eversion; 1 yr. in bed	Imp.
10	31 y.	36 y.	M.	R.	Simple	Straight, single inclined plane, with extension.	U.		1½ in	Fall on feet; on crutches in 10 weeks; slight halt.	Imp.
11	40 y.	14 h	M.	L.	Simple	Straight splint.			½ in	Crepitus; eversion.	Imp.
12	51 y.	9 y.	F.	L.	Simple, probably within capsule	Double inclined plane.			1 in.	Fall on trochanter; eversion; no crepitus; no shortening at first.	Imp.
13	67 y.	1 y.	F.	R.	Simple	Flexed pos.; over pillows, &c.			1 in.	Fall on trochanter; eversion; no crepitus.	Imp.
14	39 y.	6 y.	M.	L.	Simple, probably without capsule	Straight splint.	N. U.		2 in.	Blow on trochanter; eversion.	Imp.
15	57 y.	3 y.	M.	L.	Simple, within capsule	No splints.	N. U.		1½ in	Fall on feet.	Imp.
16	51 y.	7 y.	F.	R.	Simple	No splints.			¾ in.	Not able to walk under 6 months.	Imp.
17	42 y.		M.	L.	Simple, without capsule	Straight splint, with extension 6 weeks.	U.	6 w	½ in.	Fall on trochanter; no crepitus; eversion; death on 46th day.	Imp.
18	76 y.	2 m.	F.		Simple	Double inclined plane.				Fall on hip; died in 4 months.	Imp.
19	48 y.	5 y.	M.	L.	Simple, within capsule	Detention in bed a few days, and then walking with crutches.	U. by lig.		1½ in.	Not shortened at first; subsequently shortened and everted.	Imp.
20	84 y.	5 m.	F.	L.	Simple, without capsule	In bed 6 weeks.	U. by bone	6 w.	½ in.	Slight eversion.	Imp.
21	54 y.	8 w	M.	R.	Simple, without capsule	Straight splint 6 w.	U. by bone	6 w.	1 in		Imp

FEMUR.

UPPER THIRD (Top of Trochanter Major).

No.	Age when it occurred.	Time since it occurred.	Sex	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
22	23 y.	2 m.	M.	L.	Simple					Fall on trochanter; no shortening of limb, but fragment displaced.	

UPPER THIRD (Below Trochanter Major).

23	27 y.	6 w.	M.	R.	Simple	My own straight splint.	U.	3 w.	¾ in.	In all other respects perfect.	Imp.
24	7 y.	4 w.	F.		Simple	Author's straight splint 4 weeks.	U.	4 w.	½ in.	Nearly perfect.	Imp.
25	30 y.	1 y.	M	R.	Simple	Gibson's straight splint 2 weeks, then double inclined plane, &c.	U.	10 w.	¾ in	Ulceration on instep.	Imp
26		2 y.	M.	R.	Simple	Double inclined plane.	U.		1½ in.		Imp.
27	42 y.	4 y.	M.		Simple		U.		¾ in.	Slightly bent.	Imp
28	9 y.	31 y.	M.	R.	Simple		U.		1½ in.	Limps very little	Imp.
29	55 y.	6 w.	M.		Simple	Straight splint.	U.	6 w.	¾ in.	Broken at seat of an old fracture.	Imp.
30	49 y.	7 w.	M.		Simple	Double inclined plane.	U.		½ in.		Imp
31	1 y.	1 y.	M.	R	Simple	Lateral splints.	U.		none	Slight bend at point of fracture, and slight inversion of toes.	P.
32	40 y.		M.	R.	Simple	Straight splint 18 d., and double inclined plane, 16 days.	U.	5 w.	½ in.		Imp
33	13 y.	10 w.	M.	L.	Simple	Potter's straight splint.	U.		1 in.		Imp.
34	5 y.	8 w.	M.	L.	Simple	Straight splint.	U.	4 w.	¾ in.	No halt.	Imp.
35	55 y.	2 m.	F.		Simple	Welch's splint as a double inclined plane 1 week, and then as a straight splint.	U.		½ in.		Imp
36	47 y.	2 y.	F.	L.	Simple	Various.	U.		1 in.	Bent forwards at seat of fracture.	
37	39 y.		M		Simple	Straight splint.	U.	52 d.	¾ in.	A re-fracture; slough on heel.	Imp
38	16 y.	12 y.	M.	L.	Simple		U.		3½ in.	Fractured three times at same point.	Imp
39	14 y.		M.	L.	Compli-cated	Day's double inclined plane.	N. U.		¾ in.	Death in 4 weeks.	Imp.

MIDDLE THIRD.

40	9 y.	3 m.	M.	L.	Simple	Straight splint.	U.	4 w.	none		P.
41	13 y.	1 m	M.		Simple	Straight splint.	U.	3 w.	none		P.
42	9 y.	1 y.	M.	R.	Simple		U.		none	Slightly bent forwards and outwards.	P.
43	3 y.	63 y.	M.		Simple		U.		none		P.
44	15 y.	30 y.	M.		Simple		U.		none		P.
45	3 y.	1 y.	M.		Simple	Pillows.	U.		none		P.
46	5 y.	2 y.	M.	R.	Simple	Straight splint.	U.				
47	8 y.	6 w.	F.	R.	Simple	Straight splint.	U.	4 w.	½ in.		Imp.
48	19 y.	1 y.	M.	L.	Simple	J. F. Flagg's straight splint.	U.	5 w.	½ in.	Bent outwards at seat of fracture.	Imp.
49	9 y.	46 d.	M.	R.	Simple	Gibson's splint.	U.	46 d.	½ in.		Imp.
50	18 y.	1 m.	M.	L.	Simple	Straight splint.	U.	23 d.	¾ in.		Imp.
51	10 y.	2 m.	M.		Simple	Hamilton's straight splint.	U.	1 m.	½ in.		Imp.
52	12 y.	5 w.	M.	L.	Simple	Hamilton's straight splint.	U.	5 w.	½ in.		Imp.
53	11 y.	11 w.	M.	R	Simple	Straight splint.	U.		½ in.		Imp.

FEMUR.

MIDDLE THIRD—*Continued.*

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
54	6 y.		M	R.	Simple	Gibson's and then Hamilton's straight splint.	U.	1 m.	½ in.	Slightly bent forwards and outwards.	Imp.
55	22 y.	2 m.	M	R.	Simple		U.		2 in.	Much bent outwards at seat of fracture.	Imp.
56	36 y.	4 m.	M.		Simple	Straight splint.	U.		1 in.		Imp.
57	22 y.	2 m.	M.	R.	Simple	Flagg's straight splint.	U.	2 m.	½ in.		Imp.
58	8 y.	5 y.	M.	L.	Simple	Double inclined plane.	U.		½ in.		Imp.
59	5 y.	11 d.	M.	L.	Simple	Side splint only.	U.	11 d.	½ in.		Imp.
60	49 y.	2 m.	M	L.	Simple	Straight splint.	U.	3 w.	½ in.		Imp.
61	22 y.	9 w.	M.	R.	Simple	Straight splint.	U.		½ in.		Imp.
62	13 y.	13 y.	M.		Simple		U.		1½ in.	No halt; spine crooked.	Imp.
63	15 y.	19 y.	M.	L.	Simple		U.		¼ in.		Imp.
64	16 y.	25 y.	M.	L.	Simple		U.		½ in.	No halt.	Imp.
65	30 y.	5 y.	M.	L.	Simple		U.		1¼ in.		Imp.
66	25 y.	17 w.	M.	L.	Simple	Straight splint.	U.		¾ in.	Upper fragment on inside of lower.	Imp.
67	30 y.	1 y.	M.	L.	Simple	Double inclined plane.	U.		¾ in.	Some bent outwards at seat of fracture.	Imp.
68	7 y.	6 w.	M.		Simple	Gibson's straight splint 2 weeks, and then Hamilton's.	U.	39 d.	¼ in.		Imp.
69	40 y.	4 y.	M.	R.	Simple	Double inclined plane.	U.	6 w.	1 in.	Bent forwards at seat of fracture.	Imp.
70	8 y.	1 y.	M.	L.	Simple	Desault's straight splint	U.			Bending of limb from non-consolidation of callus; bent outwards.	Imp.
71	8 y. 14 y.	22 y. 16 y.	M		Simple	Straight splint.	U.		¼ in.	Broken twice at same point.	Imp.
72	14 y.	15 w.	M.	L.	Simple	Straight splint; after 11 weeks, Hamilton's splint.	D. U.	13 w	¾ in.		Imp.
73	22 y.	1 y.	M.	R.	Simple		U.		3 in.	Re-fractured after four mos., and reunion after 40 days more.	Imp.
74	23 y.	7 m.	M.	L.	Simple	Double inclined plane.	U.		2 in.	Bent forwards at seat of fracture.	Imp
75	23 y.	7 m.	M.	R.	Comminuted	First double inclined plane; straight splint after 5 w'ks.	D. U.	5 m.	2 in.	Same case as 74.	Imp.
76	4 y.	5 y.	F.	L.	Simple	Double inclined plane.	U.			At first bent forwards, and subsequently becoming straight.	Imp.
77	4 y.	5 y.	F.	R.	Comminuted	Double inclined plane.	U.			Same case as 76.	Imp.
78	28 y.	12 y.	M.	R.	Simple	Straight splint.	U.	7 w.	1 in.	Mollities ossium; both legs bent.	Imp.
79	25 y.	2 m.	M.	L.	Complicated	Straight splint.	U.		½ in.		Imp
80	14 y	8 y.	M.	R.	Simple	Side splints and flexed positions.	U.			Paralytic limb; exact result unknown.	
81	18 y.	10 w.	M.	R.	Compound	Potter's straight splint.	U.		1½ in.		Imp.
82	8 y.	2 m.	M	L.	Compound	Pott's method.	U.	2 m.	1 in.		Imp.
83	24 y.	2 m.	M.	L.	Compound	My own splint.	U.		½ in.	Gunshot fracture.	Imp.
84	35 y.	2 m.	M.	R.	Comminuted	Double inclined plane.	U.		2 in.	Bent forwards at seat of fracture.	Imp.
85	14 y.	17 y.	M.	L.	Com'und comminuted	Double inclined plane.	U.		1 in.	Atrophy of limb; slight halt.	Imp.
86	23 y.	38 y.	M.		Com'und comminuted		U.		1½ in.	Gunshot fracture.	Imp.

FEMUR.

LOWER THIRD (Remote from Condyles).

No	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or Imperfect.
87	8 y.	2 m.	M.		Simple	Hamilton's straight splint, &c.	U.	1 m.	none		P.
88	3 y.	1 y.	M.	L.	Simple	Double inclined plane 13 days, then Hamilton's straight splint.	U.		none	On the 13th day the limb was shortened, before the straight splint was applied.	P.
89	24 y.	30 y.	M.	R.	Simple	Double inclined plane.	U.		1½ in.	Slight halt.	Imp.
90	12 y.	5 y.	M.		Simple		U.		1 in		Imp.
91	12 y.	7 w.	M.		Simple	Straight splint.	U.		¼ in.		Imp.
92	11 y.	1 m.	M.	R.	Simple	Straight splint.	U.	1 m.	½ in.	The upper fragment on outside of lower.	Imp.
93	27 y.	2 m.	F.	R.	Simple	Straight splint.	U.	5 w.	½ in.		Imp
94	10 y.	4 y.	M.		Simple	My own double, straight splint.	U.	1 m.	¾ in.	Slight forward projection at seat of fracture, at end of 1 mo.	Imp.
95	30 y.	3 m.	M		Simple	Gibson's straight splint.	U.		¼ in.		Imp
96	25 y.	6 w.	M.		Simple	Straight splint.	U.	6 w.	¼ in.	Ulcer on heel.	Imp.
97	23 y.	11 w.	M.	L	Simple		D. U.	11 w.		Ulcer on heel.	Imp.
98	30 y.	2 m.	M.		Compli-cated	My own straight splint.	U.		¾ in.		Imp
99	23 y.	6 m.	M.	L.	Com-pound	Double inclined plane and plaster of Paris mould.	U.		3 in.	Refractured at end of 2 mos., and reunited in 3 w'ks; toes everted; fistula; unable to walk after 6 months.	Imp.
100	23 y.	7 m.	M.	R.	Commi-nuted	See Case 75.	U.		2 in.	See Case 75.	Imp.

LOWER THIRD (Just above Condyles).

101	4 y.	26 y.	M.	R.	Simple		U.		¼ in.		Imp
102	23 y.	16 m.	M.	L.	Simple	Long side splints, without permanent extension.	U.		1½ in.	Upper frag. in front and outside of lower	Imp.
103	23 y.	5 m.	M.	R.	Simple	Straight splint.	D. U.		¾ in.	Not united after 5 mos.	Imp
104	20 y.	5 y.	M.	R.	Com'und commi-nuted		U.		7 in.	Portions of bone lost by exfoliation.	Imp
105	7 y.	2 y.	M.	R.	Compli-cated	Double inclined plane.	U.		1 in.	Sloughing of part of foot.	Imp

ANALYSIS.

Of 105 fractures of the femur, 39 occurred in the upper third, 46 in the middle third, and 19 in the lower third; or if we confine our estimates to the shaft alone, 17 belong to the upper third, 46 to the middle, and 19 to the lower.

The femur constitutes, therefore, a striking exception to the rule which my other observations have established, that in the case of the long bones the lower third is most often the seat of fracture. The femur is most often broken in its middle third.

Of the fractures belonging to the upper third, 21 were fractures of the neck, one was a fracture of the top of the trochanter major, and 17 occurred below the trochanter minor. All were uncomplicated with external wounds.

Neck.

Of the fractures of the neck, 6 are supposed to have been within the capsule, 6 to have been without, and 9 are undetermined.

The youngest person having a fracture declared to be within the capsule, was 48 years old, and the oldest 77, the average of their ages being 58½ years; 4 were males and 2 females; 2 are believed to have been produced by falls upon the trochanter major, and one by a fall upon the feet. In 3 cases, the toes were everted, in 1 case neither eversion nor inversion occurred, and in the remainder no mention is made of this circumstance. In 4 cases no crepitus could be detected. In 4 cases, also, the limb was not shortened at first. All of these patients recovered, but with a shortening of the limb varying from one to three inches, and averaging one inch and seven-twelfths, or a fraction over one inch and a half.

The youngest person having a fracture of the neck of the femur, declared to have been without the capsule was 39 years old, and the two oldest were each 84 years. The average of their ages was 62 years; 3 were males and 3 females; 4 are believed to have been produced by falls or blows upon the trochanter major. In 5 cases eversion of the toes and foot was observed. The absence of crepitus is mentioned twice. All recovered with a bony union of the fragments, but Case 17 died on the forty-sixth day, from causes independent of the fracture, and after bony union had occurred. The shortening varied from half an inch to two inches, the average being eleven-twelfths of an inch.

Résumé of all the Fractures of the Neck of the Femur.

An analysis of all of the 21 cases of fracture of the neck of the femur presents the following results: The youngest person was 39 years old, the oldest 84. Average of age, 60 years; 11 males, 10 females; 8 occurred in the right thigh, and 10 in the left. All were simple; 6 were believed to be without the capsule, 6 were believed to be within, and the remainder were undetermined. Eversion was present, either immediately or soon after the accident occurred, in 13 cases. In one case the toes were neither turned in nor out.

Crepitus was observed in 1 instance, and the absence of crepitus is noticed in 7.

Only one patient died in consequence of the fracture (Case 18); and this person not until after four months. (It will not be forgotten that inasmuch as the object of my report is to exhibit the results of treatment peculiar to fractures, I am compelled still to omit in my record all cases which terminate fatally immediately, or within a short period after the occurrence of the accident; and especially because in a majority of such cases the patients have died from other complications, and from causes wholly or mainly independent of the fracture. Accordingly, in my enumeration of fractures of the neck of the femur, I have omitted one case which terminated fatally after a few hours.)

In 5 cases the shortening was only half an inch; in 2 it was three-quarters of an inch; in 5 it was one inch; in 4 one inch and a half; in 1 one inch and three-quarters; in 1 two inches; in 1 three inches; and in 2 cases the exact amount of shortening was not determined; in no case, however, did the patient recover without some shortening. The average shortening was one inch and one-seventh. In Cases 2, 5, 12 and 19 there was no shortening at the time of the first examination, yet in the first of these cases the shortening finally reached the extreme limit of three inches.

In Case 1 the patient was on crutches within three weeks; in Case 8 within one month; in Cases 14 and 20 within six weeks; in Cases 17 and 21 in seven weeks; in Cases 2 and 3 within two months; in Cases 10 and 12 within ten weeks; in Case 13 within three months; in Case 16 within six months; in Case 7 within eight months; in Cases 4 and 9 within one year. Case 6 was bedridden at the end of five years. Exclusive of this last case, and of the patient who died at the end of four months, the average period of confinement to bed was four months and two days.

Shaft.

One case, among the fractures of the upper third, is recorded as a fracture of the top of the trochanter major; whether this was complicated with any further lesion of the bone in this vicinity, it is perhaps impossible to say positively. The fragment remained slightly drawn up from the body of the trochanter.

The remaining cases of fracture of the upper third of the femur, 17 in number, occurred below the trochanter minor. Of these, all except Case 39, which terminated fatally in four weeks, were simple,

unless we except also Cases 29, 37 and 38, which were re-fractures; and most of them were believed to have been oblique.

Case 31, occurring in a child one year old, united without any shortening. All of the remainder were shortened. Thus, 1 was shortened one-quarter of an inch; 3 half an inch; 7 three-quarters of an inch; 2 one inch; 2 one inch and a half; and Case 38, which had been broken three times at the same point, finally became shortened three inches and seven-eighths. The average shortening, exclusive of this latter, was four-fifths of an inch.

It is remarked in four cases that there remains at the seat of fracture more or less bending. In Cases 31 and 36, the angle was salient forwards; in Case 23 it was salient outwards and only slightly forwards.

In eight cases, the straight splint, with extension and counter-extension, was employed throughout the treatment, or in so much as to be responsible for the result; in three cases, the double inclined plane; in two cases, both were employed at different periods of the treatment; in the remainder, the plan of treatment is not mentioned, except that in Case 31 only lateral splints were employed. I believe, also, that in all of the cases lateral splints were used. The average shortening in those treated by the straight splint, with extension and counter-extension, is two-quarters and five-seventeenths of an inch, and by those treated alone by the double inclined plane, it is three-quarters and two-elevenths of an inch. In no case where the straight splint was used did the shortening exceed one inch, while in one case where the double inclined plane was used it reached one inch and a half. As to the bending occasionally noticed at the seat of fracture, the observations are not sufficiently numerous to establish any rule; yet it is proper to remark that where the straight splint had been employed such a deviation has been recorded but once, and then it was slight, and that the deviation was outwards rather than forwards.

Of the forty-six fractures of the middle third, thirty-seven were simple, the remaining nine being complicated by either a wound communicating with the fracture, or by being broken more than once, or by other graver accidents. Indeed, two of the fractures marked simple were accompanied with a fracture of the opposite femur; one was rebroken after it had united, one was in a paralytic limb, and one was complicated with a mollities ossium of both femurs. Rejecting these cases also from the present enumeration, there remain, strictly speaking, but thirty-three simple fractures.

Let us determine the results of treatment first in these cases.

In six cases, the ages of the patients ranging from three years to fifteen, and averaging eight years and a half, there was no shortening. In Case 46, the result is not ascertained, and in Case 70, although a shortening is known to have existed, yet its precise amount is not determined. In the remaining twenty-four cases, the ages of the patients ranging from five years to forty, and averaging eighteen years, there was found always more or less shortening, the amount of shortening ranging from one-quarter of an inch to two inches, and averaging half an inch and twenty-three ninety-sixths, or a small fraction less than three-quarters of an inch.

In reference to the general plan of treatment adopted in these simple fractures of the middle third, having only regard to the position of the limb, I find that of the 6 recorded as not shortened, 2 are known to have been treated with straight splints, with extension and counter-extension, and 1, a child of three years, was treated by laying the limb over a double inclined plane made of pillows, and without extension. The treatment in the cases of the remaining 3 is not recorded.

In the 24 cases declared to be shortened, 1 was treated with side splints only, in 5 cases the plan of treatment is not known, and of the remaining 18, 15 were treated by straight splints, with extension, &c., and 3 by the double inclined plane. The shortening ranging in the first class of cases from one-quarter of an inch to one inch, and averaging half an inch and one-twelfth, or a fraction over half an inch; and in the second class of cases ranging from half an inch to one inch, and averaging just three-quarters of an inch.

In speaking of the bending of the limbs noticed after union, or of the direction of the displacements of the fragments, my observations are so few as to render them valueless unless I include in the enumeration both the simple and complicated fractures.

This circumstance has been noticed in some degree in 11 cases of the 46 belonging to the middle third of the femur. In 1 case the direction of the deviation is not mentioned. In 4 cases it is said to have been forwards—that is, the angle was salient forwards at the seat of fracture: in 4 it was outwards, and in 2 it was forwards and outwards. As to the direction of the overlapping, I regret that my records furnish me only one accurate statement, and in this case the upper fragment was found lying upon the inside of the

lower, a circumstance which probably has found a place in my notes only because of its unusual character.

In 2 of the cases where a bend at the point of fracture has been distinctly noticed, the plan of treatment was not known. In 4 cases the straight splint was employed, and in 5 the double inclined plane. But to render the comparison more fair, as illustrating the value of treatment, we must reject from the first class of cases one in which the bending took place subsequent to the removal of the splint from non-consolidation, or perhaps softening of the callus, and one in which both thigh-bones were affected with mollities ossium; and from the second class of cases, also, one in which it was claimed that the bending occurred subsequent to the removal of the apparatus. The cases will then stand 2 to 4. There is another element, however, in this calculation which has been omitted. The flexed position was known to have been employed in only twelve cases, while the straight position was employed in twenty-four cases. Thus, as a result following the use of the straight splint, a bending has been observed in only 1 case out of every 12, while it has been noticed after the employment of the flexed position in the ratio of 4 cases out of every 12, or one in every third case.

18 fractures have occurred through the lower third of the femur, of which 13 were remote from the condyles, and 5 at or near the base of the condyles. Of the whole number, 13 were simple, and 5 more or less complicated.

2 cases recovered without any shortening. These were children, whose ages were respectively three and eight years. In Case 97, I am not certain whether the limb was shortened or not. The ages of the remaining 10, ranged from four years to forty-two, averaging twenty-three years. The shortening ranged from one-quarter of an inch to one inch and three-quarters, averaging three-quarters and five-tenths of an inch.

The double inclined plane was known to have been employed in only 1 case, 89, and in this case the shortening was one inch and three-quarters. In Case 102, long side splints were used, but no permanent extension. The shortening was one inch and a half. In 6 of the remaining 8 cases the straight splint was known to have been used, with extension, &c., and in no instance did the shortening exceed three-quarters of an inch The average shortening was half an inch and one-sixth.

Résumé of all the fractures of the shaft of the femur: i. e., *of all the fractures which I have recorded as occurring below the neck and the trochanter major.*

The total number was 83, of which 59 were simple, and 24 complicated, either by having been previously broken at the same point, by comminution, by an external wound communicating with the point of fracture, by a fracture of the opposite thigh, or by other complications, more or less grave. The ages of the patients ranged from 1 year to 55, and averaged 17 years. 76 were males, and 7 females. 31 are recorded as having occurred in the right femur, and 29 in the left. Case 39 died in four weeks, and before union had occurred. In Case 72, of simple fracture, union did not occur until the thirteenth week, and in Case 75, of comminuted fracture, union was delayed five months; in all of the other cases bony union occurred within the usual time. The shortest period at which bony union took place was at eleven days, in a child five years old (Case 59). In 4 cases, 2 of which were adults, bony union had occurred at the end of about three weeks; in 9 cases, all of which were under fifteen years of age, bony union had occurred at the end of one month.

In the 15 cases of persons 15 years of age, or under, where the period at which the union seemed to be firm has been noticed, the average was twenty-eight days and a fraction over. In the 9 cases of persons whose ages exceeded fifteen years, and reached thirty, including Case 75, where union was delayed five months, the average period was sixty days and a fraction over: or, if we reject Case 75, the average period was fifty days and a fraction over. In the 4 cases whose ages exceeded thirty years, and reached fifty-five, the average period was thirty-five days. (This last estimate, based upon so few cases, and including one case of very extraordinary rapid union, is not supposed to possess any value, yet I have concluded to retain it for the purpose of completing the analysis.)

The average shortening in 56 simple cases, in which the exact result is recorded, rejecting all of those which presented any form of serious complications, is half an inch and $\frac{2}{2}\frac{3}{4}$, or half an inch and a fraction less than one-tenth.

The average shortening in 47 simple cases, in which the exact result is recorded, rejecting not only all of those in which any form of serious complication existed, but also all of those which resulted in no shortening, is three-quarters of an inch and $\frac{1}{7}$.

In 32 simple cases, in which the straight splint, with extension, &c., was used, the average shortening was half an inch and $\frac{1}{3}\frac{1}{3}$, and in the 7 simple fractures, in which the double inclined plane is known to have been used, the average shortening is three-quarters of an inch and $\frac{1}{8}$, or including in the estimate all of the fractures of the femur, both simple and complicated, known to have been treated by the straight splint mainly, the average shortening is half an inch and $\frac{1}{8}$, or a fraction less than three-quarters of an inch; while in all the fractures known to have been treated mainly by the double inclined plane, the average shortening is one inch and a quarter.

With the exception of Case 104, in which a shortening of seven inches resulted, in consequence of exfoliation of the bone, the greatest shortening occurred in cases 73 and 99, each of which was shortened three inches. In the first of these cases I only know that "long side splints" were used during the first three months, whether with or without extension, I cannot say. In the second, the double inclined plane, and subsequently plaster of Paris, as a side splint, were employed.

REMARKS.

Whatever may have been the general opinion of experienced surgeons as to the question of shortening in other fractures, very few certainly have ever claimed that in fractures of the femur a complete restoration of the bone to its original length was generally to be expected. There seems, however, to have existed only certain vague and indefinite notions as to the proportion and amount of this shortening, and which have had for their basis nothing better than a few imperfectly analyzed observations.

Says Scultetus (quoting first from Hippocrates): "For the bones of the thigh, though you do draw them out by force of extension, cannot be held so by any hands; but when the first intension slacks, they will run together again; for here the thick and strong flesh are above binding, and binding cannot keep them down. *Hippocrates de fract.* Which Celsus seems to confirm, *Lib.* 8, *cap.* 10, where he writes as follows of the cure of legs and thighs: 'For we must not be ignorant that if the thigh be broken, that it will be made shorter, because it never returns to its former state.' And Avicenna, *Lib.* 4, *Fen.* 5, saith 'that it is a rare thing for the thigh once broken, to be perfectly cured again.'

"These words admonish us," continues Scultetus, "that we should never promise a perfect cure of the thigh; but rather, using all diligence, we should foretell that it is doubtful that the patient will be always lame; but when this shall happen from the nature of the fracture, or which most frequently falls out, from the impatience of the sick person, it may be imputed to our mistake; and instead of a reward, bring us a disgrace."[1]

Says Chelius: "Fracture of the thigh-bone is always a severe accident, as the broken ends are retained in proper contact with great difficulty. The cure takes place most commonly with deformity and shortening of the limb, especially in oblique fractures, and those which occur in the upper and lower third of the thigh-bone. Compound fractures are so much more difficult to treat."[2]

Maclise, while commenting somewhat indefinitely upon certain plans of treatment, takes occasion to say: "Out of every six fractures of either clavicle or thigh-bone, I believe that as the result of our treatment by the present forms of mechanical contrivances, there would not be found three cases of coaptation of the broken ends of the bone so complete as to do credit to the surgeon."[3]

Says John Bell: "The machine is not yet invented by which a fractured thigh-bone can be perfectly secured." And Benjamin Bell declares that "an effectual method of securing oblique fractures in the bones of the extremities, and especially of the thigh-bone, is perhaps one of the greatest desiderata in modern surgery." "In all ages," he adds, "the difficulty of this has been confessedly great; and frequent lameness produced by shortened limbs arising from this cause, evidently shows that we are still deficient in this branch of practice."[4]

Colles observes, that "although three or four methods of treatment are practised, the pieces at the conclusion are often found overlapped."[5] One reason for which, in his opinion, is a too blind adherence to the principles recommended by Pott.

[1] The Chirurgeon's Store-House: by Johannes Scultetus, a famous Physician, and Chirurgeon of Ulme in Suevia. London, 1674.

[2] System of Surgery, by J. M. Chelius, translated, &c., by South. First Amer. ed., vol. i. p. 627, 1847. See also p. 625, paragraph 679.

[3] Surgical Anatomy, by Joseph Maclise, Surgeon. First American ed. Part I. p. 36. 1851.

[4] System of Surgery, by Benjamin Bell, vol. vii. p. 21. Edinburgh, 1801.

[5] Lectures on the Theory and Practice of Surgery, by Abraham Colles. (Dublin.) P. 321. Philadelphia ed., 1845.

Velpeau says, that "after fractures of the femur, there is no limping unless the shortening exceeds three-quarters of an inch; and the same is true if the shortening occurs in the tibia. The reason is, that the pelvis inclines towards the shorter limb, and thus compensates for the deficiency in length. In speaking of the various contrivances for dressing the fractured femur, he remarks that most of them fail to obviate the shortening, and produce eschars, anchylosis, or troublesome arrests of the circulation. This is the price that is usually paid for the employment of these complicated machines, and a shortening of a quarter to three-quarters of an inch is not avoided after all. The simplest apparatus that will maintain the adjustment of the fractured femur, so that union may take place with shortening of only half an inch, is the best."[1]

Nélaton holds the following language:—

"A fracture of the body of the femur, with an adult, is always a grave accident, inasmuch as it demands so long a confinement to the bed, and especially on account of the shortening of the limb, which it is almost impossible wholly to prevent: accordingly, Boyer recommends to the surgeon, from the first day, to announce to the parents of the patient, the possibility of this accident. With infants, on the contrary, it is almost always easy to avoid the shortening."[2]

While Malgaigne declares his opinion on this subject thus, at length:—

"When we do not succeed in drawing back the displaced fragments, end to end, so that they may oppose themselves to the action of the muscles, it is impossible to preserve to the member its normal length, whatever may be the appareil or method employed. Surgeons are not sufficiently agreed upon that question.

"Hippocrates gives us to understand, that we can always correct the shortening; Celsus, falling into the opposite error, declared, that a broken thigh always remains shorter than the other. At a period quite recent, Desault pretended to cure all fractures without shortening, and his journal contains several examples. In imitation of Desault, various practitioners have modified, corrected, and improved the apparatus for permanent extension, and they claim to have themselves obtained as complete success. I ought then to

[1] Peninsular Journ. of Med., vol. iii. p. 384; also Memphis Med. Journ., vol. iv. p. 254 (1856).

[2] Elémens de Pathologie Chirurgicale, par A. Nélaton, tom. prem., p. 752. Paris, 1844.

declare here, in the most positive manner, that I have never obtained like results, either in the use of my own apparatus, or with that of others, nor indeed where, in pursuance of my invitation, several inventors have applied their apparatus in my wards. I have examined, more than once, persons declared cured without shortening, and yet, upon measurement, the shortening was always manifest. The misfortune of all those who believe that they have obtained those miraculous cures, is that they have not even thought of instituting a comparative measurement of the two limbs; I will say, even more, that they are most generally ignorant of the conditions of a good and faithful measurement. Sometimes, also, they have been deceived in another way; in falling upon fractures which were not displaced, especially with young persons, and they have believed that they have cured with their apparatus a shortening which had never existed. In short, when the fragments are not displaced, or even when they are brought again into a contact maintained by their reciprocal denticulations, it is easy to cure the fracture of the femur without shortening; aside of those two conditions, the thing is simply impossible.

"Several distinguished surgeons of our day have acknowledged this impossibility, and have renounced, in consequence, permanent extension. They allege, moreover, that an overriding of even three centimetres is of little importance, and occasions no limping. I cannot agree with this opinion. I have seen persons walk very well with a shortening of one centimetre; beyond this limit, either they limp, or they have lifted the heel of the shoe, or, in short, the limping is only concealed by a lateral deviation of the spine.[1] We thus are made to comprehend how a fracture with overlapping is always serious, and how cautious we ought to be in our prognosis."[2]

That the foregoing remarks are intended by the author to be equally applicable to other fractures of the shaft of the femur, than to those of the middle third, is made evident by what he has said before, when speaking of fractures of the upper third.

"The prognosis is sufficiently favorable when the fragments are

[1] Dr. Buck, of New York, thinks that with a shortening of one inch, or even of one inch and a half, the patient may have "a useful limb, with little or no halting in his gait." N. Y. Journ. of Med., vol. xvi. p. 294.

[2] Traité des Fractures et des Luxations, par J. F. Malgaigne, tom. prem. pp. 723–4. Paris, 1847.

denticulated (engrenées); when they ride, on the contrary, we must look for a shortening as almost inevitable." P. 718.

In our own country several of the most distinguished surgeons have testified to the constant difficulty, if not impossibility, of curing fractures of this bone without a shortening. In a suit instituted against a surgeon of New York city, for alleged malpractice, in the treatment of an oblique, comminuted, and otherwise complicated fracture of the femur near its condyles, "Dr. Mott testified that more or less shortening of the limb is uniformly the result after fractured thigh, even in the most favorable circumstances."[1]

In a very interesting communication made to the author of this report, by Jonathan Knight, of New Haven, late President of this Association, occurs the following passage:—

"I have seen but few fractures of the femur in the adult, unless of the most simple kind, in which there was not some remaining deformity; often slight, so as not to impair the usefulness of the limb, and in others considerable, and apparently unavoidable." Dr. Knight adds, however, "In the greater proportion of the fractures in children, the recovery has been so nearly perfect that no marked deformity or lameness has followed."

Says Dr. Gibson: "Had the surgeon no other difficulties to encounter, than such as present themselves after simple transverse fracture of the shaft of the thigh bone, he would have little reason to complain of the defectiveness of art, or of the power of nature in promoting a cure. So different, however, from this is the result of an oblique fracture of the body of the bone, or of a transverse fracture of its neck, that it is hardly possible in any case to calculate with certainty upon reunion without more or less shortening and deformity of the limb."[2]

Dr. Detmold, in his remarks made before the New York Academy of Medicine, at its meeting in March, 1855, declared his belief that a shortening of the femur always occurs after fracture, and that "but one inch of shortening in an average of twenty cases is a good result."[3]

Dr. J. Mason Warren, of Boston, writes to me as follows: "As you

[1] Boston Med. and Surg. Journ., vol. xxxiv. p. 450. See also Opinions of Drs. Reese, Post, Parker, Cheeseman, Wood, &c., in relation to the prognosis in this particular case.

[2] Institutes and Practice of Surgery, by Wm. Gibson. 6th ed., vol. i. p. 297. Philadelphia, 1841.

[3] New York Journ. of Med. Second series, vol. xvi. p. 261.

are making observations on fractures, I would state that, after a long and very careful observation, I have never yet seen, either in Boston or elsewhere, an oblique fracture of the thigh, in a patient over seventeen years of age, in which there was not some shortening. I have had cases shown to me, in which it was averred that the limb was not shortened, but on measuring myself I have found the fact otherwise. In children, I believe that union without shortening may be accomplished."

The following remarks, found in a very valuable paper, communicated by Frederick Lente, House Surgeon to the New York Hospital, to the Sept. No., 1851, of the *New York Journal of Medicine*, are so pertinent, that I shall make no apology for their length.

"In speaking of shortening in fractures of the thigh, I am aware that it is treading on somewhat delicate ground; for it is quite common for surgeons in private practice, and for surgeons of some eminence, too, and even for surgeons attached to some hospitals, to say that, as a general result, they get union of the femur *without any shortening;* and to accuse those who have taken the trouble to ascertain the amount of shortening in their cases, and who have had the candor to admit it, of carelessness or want of skill.

"From the opportunity I have enjoyed of examining numerous cases of this fracture, and in conversing with surgeons attached to this and other hospitals on the subject, I am prepared to coincide entirely with the opinion of Malgaigne, who says, in his *Traité des Fractures*, so often referred to in this paper, 'The misfortune of those who have thought that they have obtained these perfect cures, is, that they have not even thought of measuring the comparative length of the two limbs; I say, moreover, that they are often ignorant of the conditions of a good and faithful measurement.'

"There are fractures of the femur, however, as Malgaigne admits, which may be cured without shortening, but, in almost all of these, the fragments are so interlocked (maintenu par leurs denteleures réciproques) that there was no shortening from the first, which could only have been ascertained by measurement. One means which surgeons have adopted to determine as to the existence or non-existence of shortening, is to observe, when the cure has been fully completed, whether there is a perceptible limp in the gait; if not, they persuade themselves that there is no shortening. But the fallacy of this test (though sufficient for all practical purposes) is obvious, when it is known that in nine Cases out of ten there

will be no limp, though the shortening by measurement amounts to one-half or three-quarters of an inch; and I have seen patients walk some months after the cure of a fractured thigh, without any perceptible limp, with an inch or even more of shortening, and without the aid of a thick-soled or high heeled shoe. This I have assured myself of by actual observation and measurement, and so have many of the other surgeons who have been and still are connected with the hospital. We see the same result sometimes after compound fractures of the leg, when a portion of the whole calibre of the bones has been removed.

"A shortening, however, which will give rise to a perceptible limp in one person, will not be observed to affect the gait of another in any degree. It is probable that the pelvis adapts itself in some degree to the altered length of the limb, when it is considerable. Many surgeons think it only necessary to place the limbs side by side, and thus compare their relative length, to determine whether there be any shortening; indeed this has been almost the universal practice, and yet this mode is as fallacious as the other, for when the two limbs are apparently most accurately adjusted side by side in a line with the trunk, the shortened limb, from some cause or other, very frequently appears the longer, and the relative length of one may be made to vary at least an inch in appearance by an inappreciable change in its position with respect to the trunk. I am confident that an inch and a quarter of shortening might be, in many cases, overlooked in an examination conducted in this manner, so that no surgeon is prepared to say that his cases have recovered without shortening, until he has carefully measured the two limbs; and this measurement requires considerable tact and practice. The points we select are the anterior superior spine of the ilium and the inner malleolus, taking care to have the patient properly arranged on a hard mattress; when these points are tolerably prominent, as we usually find them, the measurement can be accurately made out; perhaps the variation of an eighth of an inch might take place. When these points are less prominent, as they are apt to be in fat persons and in females, the probable variations will, perhaps, amount to one-fourth of an inch. We do not trust to one measurement, but to the comparative results of two or three.

"Having premised these observations, which we have felt compelled to make at some length, in order to clear the surgeons attached to the New York Hospital of any imputation of neglect, or

want of skill in treatment of fractures, when we say that our average shortening in fracture of the femur has been three-quarters of an inch; and that while we do, now and then, get a cure without shortening, especially in children, the difference in length is sometimes an inch or more, even with the most attentive care."

Dr. Lente believes, however, that with the improved mode of extension, by adhesive plaster, then but recently adopted in the hospital, much better cures will be made; and indeed, such had already been the experience of the surgeons of that institution, and he is disposed to regard it as one of the most valuable improvements in surgery which have been suggested for many years.

It is not to be denied, however, that a few surgeons in all parts of the world have claimed, and still continue to claim, in their own practice, or from the adoption of their own peculiar plans of treatment, much better success. Indeed, some of them do not hesitate to affirm that, as a general rule, any degree of shortening is quite unnecessary.

Mr. Amesbury declares, that when the fracture is in the "middle or lower third," under a "judiciously managed" application of his own splint, "consolidation of the bone takes place without the occurrence of shortening of the limb, or any other deformity deserving of particular notice."[1]

Mr. South, in a note commenting upon an opposite sentiment expressed by Chelius, and already quoted, remarks: "In simple fractures of the thigh-bone, except with great obliquity, I have rarely found difficulty in retaining broken ends in place, and in effecting the union without deformity, and with very little, and sometimes without any shortening. For the contrary results the medical attendant is mostly to be blamed, as they are usually consequent upon his carelessness or ignorance."[2]

Mr. Hunt, of the Queen's Hospital, at Birmingham, who treats all fractures with the *apparatus immobile* of Suetin, has published the results of his observations; and of the simple fractures of the femur only one presented, after the cure, any degree of shortening; and he adds, that all other fractures which he has treated by this method were followed by "equally good results."[3] In relation to

[1] Practical Remarks on Fractures, by Joseph Amesbury, vol. i. p. 384. London ed., 1831.

[2] Op. cit., vol. i. p. 627.

[3] Researches on Pathological Anatomy and Clinical Surgery, by Joseph Sampson Gamgee. London ed., pp 159–160.

which statements, Mr. Gamgee exclaims: "This is conservative surgery. What other mode of treatment would have given such results? And those cases are not exceptional. Mr. Hunt tells us he has selected them from amongst many others equally successful. They accord with the experience recorded in my little treatise on this subject; and the works of Suetin, Burggræve, Crocq, Velpeau, and Salvagnoli Marchetti, record numerous cases no less remarkable and demonstratively conclusive."[1]

Desault, also, according to the passage from Malgaigne, which I have already quoted, "pretended to cure all fractures without shortening." I do not find, however, any other authority for this statement, as here made; neither in his *Treatise on Fractures and Luxations*, edited by Bichat, nor elsewhere. Bichat even says positively, that "Desault himself did not always prevent the shortening of the limb."[2] He declares, however, that "Desault has cured, at the Hôtel-Dieu, a vast number of fractures of the os femoris, without the least remaining deformity."[3]

Dr. Dorsey, of Philadelphia, who employed the apparatus of Desault, as modified by Physic and Hutchinson, was equally successful.[4]

Dr. Scott, of Montreal, Prof. of Clinical Surgery in the McGill College, and Physician to the Montreal General Hospital, has reported 19 cases of fractures of the long bones, taken promiscuously and without selection, from his hospital service, of which 3 belonged to the clavicle, 7 to the femur, 8 to the tibia and fibula, and 1 to the condyles of the humerus. All of which recovered without any degree of shortening or deformity; except the case of fracture of the condyles of the humerus, which occasioned death.[5]

This is not, however, quite so remarkable as the success which has attended the practice of Dr. Carnochan, of the Emigrants' Hospital, New York, under whose care, during the year ending in Sept., 1853, every fracture of a long bone, 49 in number, was made to unite without any measure or quality of deformity. Such, at least, is the statement of the four house surgeons.[6] It is true that

[1] Op. cit., p. 167.

[2] A Treatise on Fractures and Luxations, etc., by P. J. Desault, edited by Xav. Bichat. Amer. ed., p. 251. 1805.

[3] Op. cit., p. 223.

[4] Elements of Surgery, by John Syng Dorsey, vol. i. p. 163. Philadelphia, 1813.

[5] "Medical Chronicle" of Montreal, vol. i. No. 7, 1853.

[6] New York Med. Gazette, vol. ii. p. 530.

the statistical enumeration contains no cases of fractures of the femur, yet no one who reads the report could doubt, but that if such cases had occurred, the results would not have been at all different.

It is never a pleasant duty to call in question the accuracy of another's statements, as to what he has himself alone seen and experienced. The circumstances which would justify such an expression of scepticism, where the witnesses, as in this case, are presumed to be intelligent and honest men, must be extraordinary. Such, however, I conceive to be the circumstances in this instance. It is certainly very extraordinary that a few gentlemen of acknowledged skill, but whose means and appliances are concealed from no one, are able to do what nearly the whole world besides with the same means, acknowledges itself unable to accomplish. Such is the fact nevertheless: and our lack of faith in their testimony is only a necessary result of our experience, and of the experience of the vast majority of practical surgeons, as opposed to theirs.

I might properly enough dismiss this subject with no further argument than may be found in the overwhelming testimony of practical surgeons, that broken femurs do in their experience rarely unite without more or less shortening; but I cannot avoid calling attention to the evidence of the falsity of the opposite opinion, which is furnished by the testimony of the very persons who themselves claim to have obtained such fortunate results.

It is not, as might have been supposed, one particular form of dressing, which in itself peculiar, and more perfect than all others, has furnished these results. On the contrary, the plans of treatment have been constantly unlike, and sometimes quite opposite. Thus: Desault used a straight splint, with extension and counter-extension, and he refused to adopt the flexed position recommended by Pott, because his experience and the experience of other French surgeons, had taught them its inutility.[1] Adopting the straight position, he made perfect limbs; with the flexed position, he found it impossible to do so. Dorsey used the splint of Desault, as modified by Physic and Hutchinson.

South, whose success seems to have been equal to that of Desault or Dorsey, adopts also the straight position; but he employs no means for making permanent extension, except what may be ac-

[1] Works of Desault. Op. cit., p. 225.

complished through the medium of four long side splints applied after "gentle" extension has been made by the assistants.

Mr. Amesbury, on the other hand, made perfect limbs only with his own double inclined plane; and speaking in general of the various plans hitherto contrived, not excepting that invented by Desault, or the method practised by South, which had already been recommended by several surgeons, he declares that "they are seldom able to prevent the riding of the bone, and preserve the natural figure of the limb. Indeed, so commonly does retraction of the limb occur under the use of the different contrivances usually employed, that I have heard a celebrated lecturer (now retired) in this town, publicly assert, that he never saw a fractured thigh-bone that had united, without riding of the fractured ends!"[1] And in his "*General Inferences*," he uses the following emphatic language: "The contrivances which are commonly used in the treatment of these fractures, do not sufficiently resist the operation of the forces above mentioned, but suffer their influence to be exerted upon the bone, in all cases more or less injuriously, and at the same time often assist in *producing* displacement of the fractured ends; so that deformity, differing in kind and degree in different cases, is almost the constant result of fractures of the femur treated by these means."[2]

While Mr. Gamgee, a writer of much talent and industry, thus broadly contradicts the statements of Desault, South, Dorsey, and Amesbury, and administers a severe rebuke even upon the illustrious Liston. "Pott's plan, the long splint, M'Intyre, and their modifications, as a rule entail sensible deformity, which in many cases is very considerable. It is a significant fact, that, though the example established in University College Hospital by the late Mr. Liston, of treating fractures of the thigh by the long splint, and of the leg by the modified M'Intyre, which are admitted equal, if not superior, to other splints, was rigidly followed in that institution, the patients admitted with broken thighs or legs were frequently discharged with manifest deformity."[3]

With how much force his own remarks as to the experience of the University College Hospital will apply to the starched bandages

[1] Amesbury on Fractures, &c., vol. i. p. 310.

[2] Op. cit., vol. i. p. 384.

[3] Advantages of the Starched Apparatus, by Joseph Sampson Gamgee. London, 1853, pp. 54–55.

used by himself, you, gentlemen, will determine when referred to the opinion of Velpeau, already quoted, who claims no result better than an average shortening of half an inch. It is true, however, that M. Velpeau prefers and advocates the starched bandage, but it is not true that he claims to be able to prevent a shortening of the bone.

"What other modes of treatment would have given such results?" This question, propounded, no doubt honestly, by Mr. Gamgee, has here its fair and satisfactory answer. Almost any of the various modes named; for if we must receive his testimony, we are equally bound to receive the testimony of Desault, South, Dorsey, Amesbury, Scott, and Carnochan. If we give credit to Mr. Gamgee, so far as to doubt the statements of these latter as to the degree of success claimed by them, by the same rule we must doubt his own statements, also, as to the degree of success claimed by himself. This I say with all sincerity and kindness, fully believing that these gentlemen are mistaken, and not that they intentionally misrepresent the facts.

In conclusion, I wish to say briefly, that in view of all the testimony which is now before me, I am convinced—

First. That in the case of an oblique fracture of the shaft of the femur occurring in an adult, whose muscles are not paralyzed, but offer the ordinary resistance to extension and counter-extension, and where the ends of the broken bone have once been completely displaced, no means have yet been devised by which an overlapping and consequent shortening of the bone can be prevented.

Second. That in a similar fracture occurring in children, or in persons under fifteen years of age, the bone may sometimes be made to unite with so little shortening that it cannot be detected by measurement; but whether in such cases there is in fact no shortening, since with children especially it is exceedingly difficult to measure very accurately, I cannot say.

Third. That in transverse fractures, or oblique and denticulated, occurring in adults, and in which the broken fragments have become completely displaced, it will generally be found equally impossible to prevent shortening; because it will be found to be generally impossible to bring the broken ends again into such apposition as that they will rest upon and support each other.

Fourth. That in all fractures, whether occurring in adults or in children, where the fragments have never been completely or at all displaced, constituting only a very small proportion of the whole

number of these fractures, a union without shortening may always be expected.

Fifth. That when, in consequence of displacement, an overlapping occurs, the average shortening in simple fractures, where the best appliances and the utmost skill have been employed, is between one-half and three-quarters of an inch.

Regarding the middle of the shaft of the femur as the type of all of the fractures of the femur, in respect of prognosis, and measurably in respect of treatment, and understanding the remarks which have already been made as especially applicable to lesions at or near this point, it will be easy to make a proper application of these conclusions to other fractures occurring through the different portions of this bone.

If we consider the muscles alone as the cause of the displacement in the direction of the long axis of the shaft, the shortening of the limb, other things being equal, must be proportioned to the number and power of the muscles which draw upwards the lower fragment. This will vary in different portions of the limb, but no where will this cause cease to operate, nor will its variations essentially change the prognosis.

I have not intended to say that other causes do not operate occasionally in the production of shortening, but only that muscular contraction is the cause by which this result is chiefly determined, and that its power will be ordinarily the measure of the shortening.

The following propositions relative to fractures of the neck of the femur, I believe to be substantially correct; and I shall take the liberty of stating them dogmatically, waiving, for the present, the evidences upon which they seem to me to rest.

First. Fracture of the cervix femoris within the capsule, when incomplete,[1] or when the fibrous and synovial capsules are not torn —in short, whenever from any cause the fragments do not sepa-

[1] Colles, Adams, King, and Tournel have reported examples of partial fracture of the neck of the femur; but none of these examples are regarded by Robert Smith as having been sufficiently attested. The specimen, however, laid before the Boston Society for Medical Improvement, in Sept. 1856, by J. B. S. Jackson, of Boston, must be regarded as conclusive, as to the possibility of this accident.

For a more full account of this specimen, see *Boston Med. and Surg. Journal* for 1856; also, an interesting paper on Fractures of the Neck of the Thigh-bone, by Reuben D. Mussey, of Cincinnati, published in the April No. for 1857, of the *Amer. Journ. of the Med. Sciences.*

rate—may unite either through the medium of fibrous structure, or of bone.

Second When, however, the fragments have been once completely, or in any considerable degree separated, it is probable that union always occurs through the medium of fibrous structure alone, or that no union takes place.

Third. When the fracture is extra-capsular, impaction of the fragments is the rule, and not, as in intra-capsular fractures, the exception.

Fourth. In extra-capsular fractures the impaction, when it occurs, is more complete than in the case of intra-capsular fractures.

Fifth. When shortening follows as a consequence of displacement, in the case of intra-capsular fractures, it is not always immediate, but may be delayed several days, and then take place either suddenly or gradually.

Sixth. On the contrary, in extra-capsular fractures a manifest shortening almost always takes place immediately, and seldom does the limb shorten subsequently.

Seventh. Examined on the first day after the occurrence of the fracture, intra-capsular fractures, as compared with extra-capsular, will probably show the smallest average of shortening.

Eighth. Examined after the complete recovery, or after the lapse of several years, the reverse of the seventh proposition will be found true.

It is not my intention to speak with more particularity than I have already done, of the form and direction of the deviations which occur with some regularity at the different points of fracture. I will only say that there is much reason to believe that the efficiency of the muscles inserted into the trochanter minor, in producing a forward displacement of the upper fragment, when the fracture is just below this point, has been by some surgeons greatly over-estimated: and a similar remark will apply, only perhaps with less force, to a fracture just above the condyles, where the direction of the fracture is obliquely downwards and forwards.

I may very properly, however, call attention in this place to the unusual direction of the fracture, and character of the displacement, in Case 105, p. 286—the direction of the fracture being from above downwards, and from before backwards, a circumstance which, as occurring at this point, just above the condyles, is probably very rare. The pressure of the lower end of the upper fragment upon the popliteal artery so far arrested the circulation in the lower por-

tion of the limb as eventually to produce a sloughing of a considerable portion of the foot: the death of the foot being preceded by extreme pallor, shrinking, and coldness of the toes.[1]

Sir Astley Cooper does not seem to have recognized this form of fracture and displacement. Amesbury has, however, recorded one case, which came under his own observation, where, although the bloodvessels and nerves escaped, the bone projected through the skin in the ham, and finally exfoliated.[2] And he thinks the point of bone may sometimes so penetrate the artery, and injure the nerves as to render amputation necessary, in order to save the life of the patient.

M. Coural also has related a case in which an epiphysary disjunction, occurring in a child twelve years old, was attended with a displacement of the upper fragment backwards, and amputation became necessary.[3]

I know of no other cases of this rare accident which have been reported. Lonsdale refers to it as "the rarest direction for a fracture to take;"[4] and thinks that in case of its occurrence, the vessels in the popliteal space will stand a chance of being wounded; but he mentions no example. I have seen, however, in the valuable collection of bones belonging to Dr. March, of Albany, an oblique fracture of the femur just above the condyles, in which the upper fragment is behind the lower. It is united by bone, and with a shortening of two and a half or three inches.

The popliteal artery hugs the bone so closely at this point, that a displacement of the upper fragment in a direction downwards and backwards, must always greatly endanger its integrity. Indeed, it is here that the artery and vein are in the closest contact with each other, and with the bone: an anatomical fact, which has been used by Richerand and others to explain the greater frequency of aneurisms in the ham.

Especial notice ought also to be taken of the unusual case reported by Dr. Alph. B. Crosby, of Hanover, N. H., of a fracture of the external condyle of the femur, the small fragment having been successfully removed by Dr. Crosby, after the lapse of six months. The case is reported at length in the *New Hampshire Med. Journal*,

[1] For a more full account of this case, see *Buffalo Med. Journal*, vol. xii. p. 41, Dec., 1856.

[2] Remarks on Fractures, &c., by Joseph Amesbury, vol. i. p. 293. London, 1831.

[3] Archiv. Gén. de Méd., tom. ix. p. 267; also Malg., Op. cit., p. 733.

[4] Treatise on Fractures, by Ed. F. Lonsdale, p. 319. London, 1838.

for 1857, and the size and form of the fragment are illustrated by a drawing which accompanies this report. I have at this moment the specimen in my possession, it having been sent to me by Dr. Crosby, for examination, and there can be no doubt that the opinion of this distinguished surgeon, as to the character of the fracture, is correct.

Dr. Crosby's specimen of fracture of the external condyle.

The reported cases of a fracture of one of the condyles of the femur are not numerous. Sir Astley Cooper and Bransby Cooper have each mentioned one case; Boyer has reported one case; Malgaigne has seen three, and there are three specimens in the Dupuytren museum. One case also is reported in the 15th vol. of *Braithwaite's Retrospect*, p. 149.

Dr. Wells, of South Carolina, has reported a case of dislocation of the knee, accompanied with a fracture of the inner condyle. The patient died on the second day. An examination after death showed "that a thick scale of bone was fractured from the inner part of the inner condyle, and remained attached to the ligament."[1] And Dr. Kirkbride has reported a case of fracture of the external condyle, which was presented at the Pennsylvania Hospital, and which resulted in a very perfect cure.[2]

Note.—I have seen no case of a fracture through, or between the two condyles, extending into the joint, except a single specimen contained in the museum of the University of Pennsylvania.

Nor has it ever occurred to me to meet with an epiphyseal disjunction, occurring as the direct result of violence, either at the upper or lower end of the femur. South had a case of this kind, where the separation occurred through the neck, in a boy ten years old. Dr. Post, of New York, related to the members of the Kappa Lambda Society, in March, 1840, a similar case which had recently come under his observation, in a girl sixteen years old. The limb

[1] Amer. Journ. of Med. Sci., vol. x. p. 25.
[2] Ibid., vol. xvi. p. 32.

remained permanently shortened.[1] At a meeting of the New York Pathological Society, held in Oct., 1855, Dr. Markoe presented a specimen, taken from a girl nine years of age, in which the neck was broken, or separated just external to the capsule, and exactly in the line of the epiphyseal junction. The trochanter was also fissured, showing that the lesion had partaken a little of the character of an impacted fracture;[2] and Dr. Parker called attention, in his clinic at the College of Physicians and Surgeons, to what he believed to have been a similar accident in a girl eighteen years old. It had resulted in suppuration, and permanent shortening of the limb.[3]

TREATMENT.

In pursuance of the plan which has been hitherto observed, in the several sections of my report, I shall devote a few pages to the consideration of the *treatment* of fractures of the femur.

We have no space for a full discussion of the various plans which have been devised and practised by skilful surgeons for the treatment of these fractures. Nor, indeed, is there room for their mere enumeration: and I shall content myself with only a brief consideration of the question of *posture*, as that alone upon which surgeons have at any time greatly differed, and in relation to which, debate is not yet altogether at an end.

All of the early surgeons, so far as we know, adopted the straight position in the treatment of fractures of this bone: either with simple lateral splints, or with long splints, with or without extension, or with only rollers and compresses, or with extension alone.

Such were the unanimous opinions and practice of surgeons, until about the middle of the last century; at which time Percival Pott wrote his remarkable treatise on fractures, distinguished alike for the originality and boldness of its sentiments, and which was destined soon to revolutionize the old notions, as to the treatment of fractures, and to establish in their stead, at least for a time, what has been called not inappropriately, the "physiological doctrine." The peculiarity of which doctrine consisted in its assumption, that the resistance of those muscles which tend to produce shortening can generally be sufficiently overcome by posture, without the aid

[1] New York Journ. of Med., vol. iii. (first series) p. 190.
[2] Amer. Med. Monthly, vol. iv. p. 390.
New York Med. Gaz., vol. i. p. 342.

of extension, and that for this purpose, for example, in the case of a broken femur, it was only necessary to flex the leg upon the thigh, and the thigh upon the body; laying the limb afterwards quietly on its outside upon the bed.

Very few surgeons, even of his own day, ever gave in their full adhesion to the exclusive physiological system as taught and practised by Pott himself, but multitudes, especially among the English, adopted in general his views; only choosing to place the patients upon their backs rather than upon their sides, and laying the limbs flexed over a double inclined plane. To the support of this system of Pott's, thus modified, Sir Astley Cooper, C. Bell, John Bell, Earle, White, Sharp, and Amesbury, lent the influence of their great names, and its triumph, so far as the judgment of the British surgeons was concerned, soon became complete.

In France, and upon the Continent generally, the reception of this system, was more slow and reluctant; but Dupuytren, now for once, taking ground with his great rival, Sir Astley, adopted almost without qualification these novel views. The decision of Dupuytren determined the opinions of a large portion of the continental surgeons, and had it not been for the early and decisive opposition of Desault and Boyer, the great surgeon of St. Bartholomew might have continued for a long time to have enjoyed a triumph upon the Continent, perhaps throughout the world, equal to what had already been decreed to him in Great Britain.

On this side of the Atlantic, the practice of Pott, at least in so far as it applied to the treatment of fractures of the thigh, never gained a distinguished advocate; and but few ever adopted the practice, as modified by White, Amesbury, Bell, A. Cooper, &c.

But whatever may have been the early success of these doctrines, either here or elsewhere, it is certain that a strong reaction has taken place, and that gradually, in all parts of the world, the opinions of practical surgeons have been settling back into their old channel. It would be difficult to find to-day, in France, a dozen distinguished surgeons who adopt the flexed position in the treatment of fractures of the femur. And in England, the reaction is, if possible, even more complete.

In my tour of 1844, during which I visited very many of the hospitals of Great Britain, and upon the continent of Europe, I do not remember to have seen the flexed position once employed in the treatment of a broken thigh; and I shall presently show that

the straight position is at the present moment very generally adopted by the best American surgeons.

There have been, then, three grand epochs in the history of the treatment of fractures of the thigh.

First. That in which the straight position was universally adopted; and which reaches from the earliest periods to the period of the writings of Pott, or to about the middle of the last century.

Second. The epoch of the flexed position; which, inaugurated by Pott, had already begun to decline at the beginning of the present century, and which may be said to have been completed within less than one hundred years from the date of its first announcement.

Third. The epoch of the restoration, or that in which surgeons, by the vote of an overwhelming majority, have declared again in favor of the straight position. This is the epoch of our own day.

The opinions of most of the distinguished foreign surgeons upon this question, as upon nearly all other questions relating to our science, thanks to the abundance of our foreign medical literature, are sufficiently well known; while the opinions of my own countrymen, which are often, it will not be denied, entitled to as much respect as those of our transatlantic neighbors, but the medical literature of whose country occupies an humbler rank in the estimation of the world, are but little known even to ourselves. I deem it my duty, therefore, as far as I am able, to mention especially the views and practice of American surgeons.

"Many years since, I introduced into the New York Hospital Boyer's long splint, and continued to use it there, and in private practice, for a long time. I found, however, in many cases, that I had more or less trouble at the foot and groin from the points of extension and counter-extension. I then gradually laid it aside, and for some years have again taken up the double inclined plane.

"From the abundance which I have seen, I am free to say that, if I had my own femur broken, I would be treated upon the double inclined plane.

"The Drs. Burges, Brothers, Court St., Brooklyn, Long Island, have made an improvement upon the extended principle. Their apparatus is now complete, and is in use at the Bellevue Hospital, where I advised, some time since, that it should be tried. It has succeeded admirably in two cases."—VALENTINE MOTT. *Private Correspondence.*

"For the treatment of fractures of the thigh-bone below the neck,

I have always used the double inclined plane, as advised by Sir Charles Bell. Fractures of the leg I have treated in both modes, and with about equal success as to the ultimate result. But in these, also, as a general rule, I use the double inclined plane on the plan of Amesbury."—JAMES MCNAUGHTON, *Albany. Private Correspondence.*

"I treat all thighs, fractured in their middle part, by the long splint, and in the straight position. In fractures occurring at either end of the bone, I resort at first to the angular splint and the flexed position, and thus place the muscles more at rest; in which position, also, there is less tendency to angular displacement and shortening. After the lapse of a few days, when the disturbed muscles have lost their tendency to spasm, and the hardened cellular tissue about the fracture has formed a sort of bond between the ends of the broken bone, I gently bring the limb down to the straight position, and apply the long splint."—JOSEPH PANCOAST. *Private Correspondence.*

"I am in the habit of treating fractures of the thigh-bone, except in the vicinity of the articulations, in the extended position. I make counter-extension by means of a perineal band attached to the upper extremity of a long splint, extending nearly to the axilla; and extension by means of lateral strips of adhesive plaster secured to the lower end of the long splint. I treat fractures of the os femoris in the neighborhood of the hip and knee-joints in a semi-flexed position, in order to diminish the displacement resulting from muscular contraction.

"In the treatment of fractures in general, I have long since abandoned the method which I had been taught to regard as the correct one, viz., to defer the accurate adjustment of the fracture, and the application of splints and bandages, until after the subsidence of the inflammation following the injury. I am now in the habit of replacing the fragments as accurately as possible when I am first called to the patient, and of applying a suitable apparatus to maintain apposition; and every year's experience convinces me more fully, that this course not only secures a more favorable result, but adds greatly to the comfort of the patient. I need not say that in applying bandages to a recently fractured limb, caution is required not to strangulate the circulation.

"In one respect, my practice in the treatment of fractures deviates from that which is pursued by the majority of practitioners. I am in the habit of removing the dressing every day or two, and applying passive motion to the joints in the vicinity, to guard

against the rigidity which otherwise becomes so troublesome a symptom. I do not, however, pursue this course in the treatment of fractures of the thigh, on account of the liability to displacement of the fragments."—ALFRED C. POST, *of New York. Private Correspondence.*

"In fractures of the shaft of the femur, immediately below the trochanter minor, I have always dressed the limb with the double inclined plane; elevating the knee decidedly, and padding beneath the ham, if necessary, in a manner to effect moderate extension by the weight of the trunk. In a *transverse* fracture, also, of the middle of the shaft, with a good deal of pains-taking, I succeeded satisfactorily with an Amesbury's splint.

In all other fractures of the shaft, constituting, at least, nine-tenths of the whole, I regard the straight position of the member as indispensable to success."—JOHN DE LAMATER, *Cleveland, Ohio. Private Correspondence.*

"My usual, but not exclusive method of treating fractures of the os femoris, is by some mode of extension in the straight position. My preceptor, Warren, secundus, rarely employed any other method, and my impressions—too indefinite and inexact for your present purpose—are that he brought most of his cures out with but little deformity or shortening. As to the results of my own practice in this particular instance, as well as in the whole section of surgery to which it belongs, although my patients have generally recovered with useful limbs, yet such a retrospect as I am able to make, favors the same conclusions as those to which your record of a very large and diversified experience is calculated to bring us, respecting the imperfect state of this department of our art.

"Of late years I have generally employed Liston's single long splint; having it thickly padded, and then applying a roller from the foot to the hip, in such a manner as to secure the limb firmly to the splint. This is about the only case in which I now wrap a fractured limb with a roller." * * * * * *

"I have repeatedly used, and with much satisfaction, in the fractures to which you refer, extension by means of the pulley, having the co-operation only of short lateral splints at the place of the fracture. With a mattress slightly inclined towards the head, and moderate, but persistent traction made on the injured limb by a weight made fast to the foot by means of a cord passing over a pulley—the pulley being secured to the foot-board. I have con-

ducted some tolerably oblique fractures to a satisfactory termination, and with much more comfort to the patients than attends any other equally effectual method of extension."—JOSHUA B. FLINT, *Louisville, Ky. Private Correspondence.*

"In the treatment of fractures of the femur, I employ neither the straight nor the flexed position exclusively, but the one or the other, according to the site of fracture. If the fracture involves either the upper (below the trochanter minor) or the lower third (above the condyles) of the femur, I make use of the double inclined plane of Sir Charles Bell. If, on the other hand, the seat of fracture be in the middle third of the thigh, I greatly prefer the straight, long splint of Mr. Liston.

"My reasons are briefly the following: In fractures below the trochanter minor, the upper fragment is tilted forwards and upwards, by the unrestrained action of the psoas muscle, so that no extension in the straight direction will avail to draw down the upper in a line with the lower portion of the lever.

"The same thing results in fractures of the lower third, but in opposite directions. Here the heel becomes the fixed point, and the gastrocnemii draw the lower fragment backwards and downwards, whilst the upper fragment projects in front. Rectilinear extension can no more correct the malposition of the lower fragment in this case, than it can in the former that of the upper. But in both (upper and lower third fractures), by placing the limb over a double inclined plane, these otherwise insuperable deviations of the fragments are prevented, and the whole bone is brought into proper line.

"When, on the contrary, the fracture implicates the middle third or even the middle half of the femur, I invariably employ the straight splint, which I regard as by far the simplest, most effectual, and best means of treatment: and, indeed, but for the reasons assigned, I should only be too glad to use it exclusively in the management of all fractures of the thigh.

"My cabinet presents several specimens of broken femurs, which illustrate the soundness of these views: in which the abnormal direction of the fragments alluded to as occurring in fractures of the upper and lower thirds, is very marked; the deformities having resulted from treatment in the straight position. So far as function and symmetry are concerned, the lower deformity is altogether the most serious. The unseemly projection above the knee, the unnatural exposure in front of the articular surfaces of the

condyles, which are not set bluffly on those of the tibia, together with the altered site of the patella, and the diminished power of the quadriceps muscle, both weaken and deform the joint.

"With regard to the management of fractures below the trochanter minor, or at other points of the femur, by means of the double inclined plane, I am well aware of the difficulty of properly confining the pelvis, but this objection I am far from considering as insuperable. So, too, the outward tendency of the upper fragment, caused by the gluteus, may be humored by carrying the limb off at an oblique angle to the axis of the body.

"It is, perhaps, needless to add, that in fractures of the condyles, of the inter-trochanteric portion, as well as of the neck of the femur (when osseous union is attempted), whether within or without the capsule, I likewise give preference to the straight position.

"I will here also incidentally state that I have found much satisfaction in the treatment of fractures of the leg (tibia and fibula), by the long splint in unruly patients, and those suffering the complication of delirium tremens. The apparatus is applied as in fractures of the thigh, more attention of course being paid to the adjustment of the leg."—CHARLES A. POPE, *St. Louis, Mo. Private Correspondence.*

"In the early part of my practice, following the advice of Dr. Physick, I treated all cases of fracture of the thigh with the long straight splint of Desault; afterwards adopting the practice of Dr. Nathan Smith, I treated many cases by placing them in the flexed position, upon some form of the double inclined plane.

"For many years past, I have selected one or the other of these methods, according to the age of the patient, and the form and position of the fracture.

"In the fractures of the thigh in children, which are commonly near the middle of the bone, and less oblique than in the adult, and in whom the muscles are less active in shortening the limb, I have usually preferred the flexed position, depending very much upon frequent examination and readjustment of the parts, as well as the dressings, when necessary, for preserving the bones in their place. In fractures of the neck of the bone, or through the trochanters, I have used exclusively the long splint, as no other method can be relied upon for preserving the length of the limb.

"Oblique fractures, near the middle of the bone, in the adult, have been usually treated in the same way. The practical difficulty in the use of the long splint is the pain and subsequent inflammation

produced upon the parts to which extension and counter-extension are applied. Of late, much of this has been avoided by making extension with adhesive straps, as recommended by Dr. Josiah Crosby, of New Hampshire.

"In fractures of the upper part of the shaft of the bone, the lower end of the upper fragment is so much tilted forwards by the flexor muscles of the thigh, that it is difficult, perhaps impossible, with the limb in the straight position, to bring or retain the two portions of the bone in a line with each other. For this reason, I treat fractures of this kind in the flexed position.

"So, also, in fractures of the lower end of the bone just above the trochanter, I prefer the flexed position. These fractures, so far as I have observed them, have usually been oblique from before upwards and backwards, with the lower fragment rolled forwards by the gastrocnemii muscles. This displacement is readily remedied in the flexed position, and as the fractured surfaces are large, there is little tendency to shortening of the limb. The cases of this kind which I have seen, have recovered quite as perfectly as any other fractures of the thigh.

"In fractures of the neck of the bone, either partially or entirely within the capsular ligament, so common in persons advanced in life, I have rarely employed any firm dressings with the view of preserving the length of the limb. The prospect of any resulting benefit from their use is so slight, while they are so annoying, and not unfrequently so injurious to the health of persons at an advanced age, that I have not thought it best to employ them. I have seen no distinct case of this kind, in which any other than ligamentous union has taken place.

"In one of this kind, many years ago, a very fair one, the patient being a spare and healthy man, about sixty-five years old, I tormented him for about six weeks with the long straight splint, preserving the limb of about its full length for this time, so that on placing him upon his feet, the heel of that side came fairly to the floor; as soon as he began to bear weight upon it, it commenced to shorten by the yielding of the ligament, until it was more than an inch shorter than the other, and in about the usual state as those in which the most simple treatment is employed.

"I have seen several cases of interlocking fracture, as I supposed them to be, in which the symptoms of fracture have been so obscure as to lead to a doubt of its existence.

"These have rarely recovered perfectly, there being usually

some eversion of the limb, with some restraint of the motion of the joint.

"A case of this kind, which was accidentally rendered a perfectly plain one, may perhaps interest you sufficiently to warrant a statement of it. A lady, about sixty years old, while getting out of a carriage, caught her foot in the stirrup and fell to the ground, striking on the trochanter. An intelligent physician, who saw her at once, did not detect a fracture. She was able to ride home, a distance of about thirty miles, in a carriage, with little inconvenience.

"Upon examining her, I found her suffering little pain when at rest, except such as is common after a bruise. There was no deformity of the limb of any kind; I could give all the motions to the limb, to a moderate extent, while if larger motions were attempted, a good deal of pain and resistance of the muscles was produced. This pain upon motion, together with the inability, when lying upon the back, to raise the limb from the bed were the only symptoms of fracture. She continued in this way for three or four days, suffering very little, and able with very little assistance to move herself from the bed to a chair, and sit comfortably for several hours in the day. While sitting in this way, she attempted to raise herself erect, with her hands upon the arms of the chair. When this was partly accomplished, the arm of the chair next to the injured limb broke, and she struck forcibly, for she was a heavy woman, upon the trochanter. This was followed by severe pain, by eversion, and shortening of the limb, and by all the symptoms of fracture of the neck of the bone. After a long confinement, she had the imperfect recovery which is common in such cases. I had no doubt that the fracture was produced by the first fall, and the displacement by the second."—JONATHAN KNIGHT, *New Haven. Private Correspondence.*

"I have used the long outside splint in fractures of the thigh for many years, and prefer it to any other. I use as little bandage as possible, leaving the limb free from unnecessary pressure. In some instances, when the patient has been careful and intelligent, I have relied on extension made permanently at the head and foot of the bed, leaving off all splints after the first few days."—J. H. ARMSBY, *Albany. Private Correspondence.*

"Dr. Flagg, to whom you addressed a note through Dr. Morland, in regard to the fracture apparatus in use at our hospital" (Massachusetts General Hospital, situated at Boston), "is long since dead.

Dr. Morland has requested me to supply you with drawings, and descriptions of it. The apparatus was introduced into the hospital by my father, and has been somewhat modified from time to time. It is, I think, the best apparatus employed anywhere, and I have examined particularly the construction of these instruments, both in this country and in other parts of the world. I inclose a description and drawings, made by Dr. L. M. Sargent, artist to the hospital." * * * * "This apparatus I use for all fractures of the thigh, and have at present seven patients with it applied. We use it for fractures of the neck of the femur, as well as for fractures of the shaft."—J. MASON WARREN, *Boston. Private Correspondence.*

"For all fractures of the thigh-bone, I employ the extended position of the limb. There are but few cases in which extending force is not necessary to prevent the degree of deformity or shortening which would occur without it. Of thirty specimens of fracture of the shaft, in my collection, only two are transverse. In fractures of the neck, especially with old subjects, I sometimes avoid the application of any kind of apparatus for permanent extension; but in all cases, whether of the neck or shaft, where such extension is attempted, I have found the straight position of the limb to be the most reliable."—REUBEN D. MUSSEY, *Cincinnati. Private Correspondence.*

"If I should be asked under what circumstances I would use the double inclined plane in case of fracture of the femur, I would unhesitatingly answer, never! I have long since abjured the double inclined plane in every form of fracture of this bone, finding the straight splint fully adequate to all purposes for which any apparatus of this kind is required. In support of this statement, I could furnish a great number of cases showing that the locality of the fracture, the importance of which is so much dwelt upon in the books, constituted, in no case, a valid objection to its use."—G. KIMBALL, *Lowell, Mass. Private Correspondence.*

"In reply to your question, 'What position do you adopt in the treatment of fracture of the thigh-bone?' I answer emphatically, the straight. Many years ago, before I had much experience in this class of injuries, I occasionally employed the flexed position, but I soon found that it was objectionable, on account of the great difficulty in maintaining so accurate apposition of the ends of the fragments. Of late years I have confined myself entirely to the use of the straight position, and I have never had any cause to regret it. In the adult, I sometimes employ the apparatus of De-

sault, as modified by Physick, but much more frequently one of my own construction, somewhat upon the principle of that of Dr. Neill, described in the *Philadelphia Medical Examiner* for 1855. I have used it for nearly twenty years, and it has generally answered the purpose most admirably in my hands. It consists simply of a box for the thigh and leg, with a foot-piece, and two crutches, one for the axilla and the other for the perineum, to make the requisite extension and counter-extension. With such an apparatus, an oblique fracture of the thigh can be treated with great comfort to the patient, and with the assurance of a good limb. In children, I have effected some excellent cures simply by means of a sole leather trough, well padded and provided with a foot-piece.

"The great objection to the flexed position is the difficulty of keeping the ends of the broken bones in apposition: the upper one having a constant tendency to pass away from the inferior. Other objections might be urged against the flexed position, but this is quite sufficient to induce me to reject it."—S. D. GROSS, *Philadelphia. Private Correspondence.*

An interesting letter from Dr. Paul F. Eve, of Nashville, Tenn., I regret to say, has been mislaid. He prefers the straight splint in all fractures of the thigh, except when the fractures occur near the upper or lower end of the bone.

"In regard to fractures of the thigh and leg, I can only say that I prefer the straight position for the treatment of both, and in nearly all cases I employ it. I have no doubt, however, that as good cures can be made with the flexed position, though I think it requires more care and attention in the treatment to do so, besides being less comfortable to the patient, and more difficult to measure accurately the limb."—GEO. W. NORRIS, *Philadelphia. Private Correspondence.*

The following additional remarks, contained in Dr. Norris's letter, although not entirely apposite, are too valuable to be withheld. "Permit me to suggest to you to say something in your forthcoming work on the early inspection, and the frequency of dressing in fractures—points which seem to me to be not sufficiently attended to by our writers and teachers, and to be greatly needed. How common is it to see fractures done up and not examined for several days, and then, if the injury has been oblique, to find when opened that it is accompanied with displacement? In those about the wrist, as well as in the leg and thigh, I am sure I have often seen mischief arise from want of early dressing. Students and practitioners who do not see much surgery, are apt to imagine that examination of

the fracture and replacement of the apparatus are necessarily accompanied with pain and disturbance of the injured bone, and hence avoid it. Neither of these, however, are necessary accompaniments of the examination and re-dressing of a fracture if there be no displacement, and should there be, an opportunity is thus afforded for remedying it before it is too late.

"Another defect in the treatment of fractures about the joints which I should like to see noticed by you, is the necessity of frequent dressing in the latter stages of the cure, and the giving of careful passive motion to joints that are confined by the apparatus. In fractures near the hand, for example, particularly in the laboring classes, such motion during the cure, to the wrist and finger-joints, is all-important; as, unless practised, these cases are constantly followed by false anchyloses which require a long time to overcome, and which, in some degree at least, might be avoided by following a different course. A mention of these things in your book, though, in the eyes of those who are daily called on to treat such accidents, very ordinary matters, would, I think, be calculated to direct attention to them, and do much good in our country.

"From all that I have seen of the treatment of fractures, I am a warm advocate for frequent dressings, wherever the fractures may have occurred—in the early stages, to prevent displacements, excoriations, &c., and in the latter stages in order to give passive motion to the neighboring joints, which I know can be done without injury to the fracture. Of late years, I have been in the habit of dwelling upon these little matters as of importance, at our hospital. At the same time you must understand me as being a stanch advocate for a state of perfect rest, as, in my opinion, the only proper one for broken bones." See also remarks by Norris on bad effects of early application of tight bandages, *Amer. Journ. of Med. Sciences*, vol. xxii. p. 292.

In addition to these opinions of well known and distinguished American surgeons, which I have been permitted to declare, I will remind you also of the practice of those whose opinions, having already found a record, demand only from me a suitable reference.

The following surgeons recommend the straight position:—

Physick,[1] Dorsey,[1] Gibson,[2] Horner,[3] J. Hartshorne,[3] H. H. Smith,[3]

[1] Elements of Surgery, by John Syng Dorsey. Philadelphia, 1813, p. 175.

[2] Institutes and Practice of Surgery, by Wm. Gibson, 6th edit., vol. i. Phila.

[3] Treatise on the Practice of Surgery, by Henry H. Smith. Phila., 1856.

Neill,[1] Bache,[2] Daniell,[3] R. Coates,[4] Howe,[5] Flagg,[6] Dugas,[7] and Caldwell;[8] while the following gentlemen have given a preference to the flexed position: Nathan Smith, of New Haven;[9] Nathan R. Smith, of Baltimore;[10] and Nott, of Mobile.[11]

With one or two exceptions, it is probable that the straight position is adopted in the treatment of broken femurs in every large hospital in this country. Such I believe to be the practice in the Massachusetts General Hospital, of Boston; in the hospital under the care of Dr. Kimball, at Lowell, Mass.; in the New York City Hospital[12] and at Bellevue; in the Pennsylvania Hospital, of Philadelphia, and at Blockley. All of the surgeons attached to the Buffalo Hospital of the Sisters of Charity, including the marine wards—viz., Drs. Winne, Smith, Boardman, Samo, Wilcox, with myself—adopt the straight position, with but occasional exceptions.

The practice of treating fractures of the thigh, as well as all other fractures of the long bones, with the roller alone, and without either lateral splints or extending apparatus, first suggested by Radley, has found in this country but one distinguished advocate, Dr. Dudley, of Lexington, Ky.[13]

The general plan of treatment preferred by the writer has already been stated, and it only remains to allude briefly to certain points which do not seem to have received sufficient notice from systematic writers, or which may for other reasons possess a peculiar interest.

Without limiting ourselves to the consideration of any one of

[1] Philadelphia Med. Examiner. October, 1855.

[2] Note to Erichsen's Surgery. Philadelphia edition, p. 225. 1854.

[3] Amer. Journ. Med. Sciences, vol. iv. p. 330. (Employs a pulley for extension—represented by a drawing.)

[4] Ibid., vol. xx. p. 18.

[5] Boston Med. and Surg. Journ., vol. xxii. p. 228. (With a drawing of apparatus.)

[6] Ibid., vol. xxv. p. 223.

[7] Southern Med. and Surg. Journ. Feb. 1854.

[8] Desault's Surgery. American edition, p. 407.

[9] Amer. Med. Rev. Published at Philadelphia, 1825, vol. ii. p. 355. Also, Medical and Surgical Memoirs of Nathan Smith. Published at Baltimore, pp. 129—141.

[10] Med. and Surg. Memoirs, pp. 143—162. See also Geddings, Baltimore Med. and Surg. Journ., vol. i. 1833; and Sargent's Minor Surgery, p. 171.

[11] Amer. Journ. Med. Sciences, vol. xxiii. p. 21.

[12] Lente's Statistics of Fractures, N. Y. Journ. of Med., Sept., 1851; N. Y. Med. Gaz., vol. ii. p. 186.

[13] Amer. Journ. of the Med. Sci., vol. xix. p. 270; Transylvania Journal, April, 1836; Boston Med. and Surg. Journ., vol. xxxiv. p. 35.

the special forms of apparatus, we may say that the following ought to be regarded as essential elements in the construction of the long straight splint: Length sufficient to extend at least several inches above the alæ of the pelvis, and the same distance below the foot; such thickness as that it shall be firm and unyielding; width sufficient to make it serve as one of the lateral splints, since over all the properly called lateral splints it possesses this advantage, that it can never become displaced downwards or upwards; its width ought seldom to be less than three and a half inches, nor should its width diminish as it descends towards the foot, as in consequence of this construction the roller, which is intended to secure the limb to the splint, has a constant tendency to slide in the same direction.

A foot-piece, or transverse block to which the foot may be attached for the purpose of making extension as nearly as possible in the axis of the limb. If this foot-piece is movable, it will serve only the single purpose above mentioned, and no rule need govern its width. But in this case there must be another block attached to the bottom of the long splint, at right angles with the shaft, and of the same width as the splint; the object of which will be to support and steady the side splint, and to prevent its rolling inwards or outwards. Where this is neglected, frequent disturbance of the broken fragments, and a deformity from inclination of the foot outwards or inwards, are apt to ensue. If the foot-piece is not movable, then it may be of the same width as the side splint, and serve both to steady the side splint and as a means of extension. Its length ought not to be such as to interfere with a long inner splint, in case its use should be deemed advisable.

With two fenestra placed at the upper part of the splint, for the reception of the counter-extending band, the long outside splint is now complete.

These are, so to speak, its simple elements, and compose the splint in its rudest form, without which no splint can be perfect, yet upon which many real improvements may be based. Thus, it must be regarded as an improvement to have the splint so constructed as that it may be readily lengthened or made shorter, to accommodate itself to the size of the patient; or that the foot-piece should be furnished with a screw, for the purpose of making the extension more uniformly; or that the same mode of operating should apply also to the counter-extension.

The adhesive plaster bands are beyond all comparison the best means of making a permanent extension which are at present known to surgeons. Hitherto, one of the most serious difficulties

in the way of extension, and the objection which has been most effectively urged against its adoption, has been the excoriations, ulcerations, and even sloughing, which so often occurred from the use of the various extending bands about the ankle. This, together with the injuries occasionally inflicted by the perineal band, has been regarded by other surgeons than Dr. Mott, whose opinions we have already quoted, as a sufficient reason for preferring the flexed position. But no one who has employed the adhesive plaster extending bands will doubt that, so far as injuries to the foot and ankle are concerned, this objection is now entirely disposed of. It is adopted in many, perhaps most, of the American hospitals, and in no case where it has been employed have I known the slightest excoriations to have been produced. I regard this simple invention, therefore, as one of the most important improvements in the treatment of fractures of the thigh, and it is not surprising that several claimants have appeared for the original suggestion. By Mr. Brinton it has been claimed for Dr. Ellerslie Wallace, of Philadelphia;[1] and by Dr. Sargent for Dr. Gross, of the same city;[2] while by American surgeons generally the invention has been conceded to Dr. Josiah Crosby, of New Hampshire, to whom certainly is due the credit of having brought it into notice, if not, indeed, of the first suggestion.[3]

The mode of using adhesive plaster for extension is briefly as follows:—

A single band long enough to extend from a point just below the knee, to twelve or sixteen inches beyond the foot, and about three inches wide, is to be applied along each side of the leg. Instead of one band on each side, two may be employed; which shall traverse each other somewhat obliquely, so that one band shall fall a little in front of the malleolus and one a little behind. Having wrapped the whole circumference of the ankle, including the malleoli and heel, in a heavy pledget of cotton, laid underneath the adhesive bands, a roller is now to be applied from the toes upwards as far as the knee, and secured with a little flour paste or starch. Before fastening the bands to the foot-block, each band should be twisted into a rope below the foot; and to prevent any degree of lateral

[1] Note to American edition of Erichsen's Surgery, p. 225.

[2] Note to 3d American edition of Miller's Practice of Surgery, p. 653. See also N. Y. Med. Gaz., vol. iv. p. 87.

[3] See cases reported in N. H. Journ. of Med., for 1851; also, N. Y. Journ. of Med., vol. vi., 2d series, p. 137. See also, Trans. Amer. Med. Assoc., vol. iii. p. 382.

pressure upon the sides of the ankle and foot, already tolerably protected by the cotton, a piece of thin board, longer than the width of the ankle, and notched at each extremity, should be placed between the bands below the bottom of the foot.

The attempt to use the adhesive plaster also as a perineal band, for the purpose of making counter-extension, does not seem to have been equally successful, and we have still to incur the risk of ulcerations, &c., from this portion of our dressings;[1] fortunately, however, the perineal band never completely ligates the limb, and it has rarely, therefore, been found so mischievous as the ordinary extending bands at the ankle. In the fracture apparatus lately invented by the Burges, the peculiar mode of action of the perineal band, avoiding, as it does, pressure upon the front of the groin, diminishes still further this danger. For a description of the mode of constructing properly a perineal band, I will refer you to the excellent papers on "Fractures of the Lower Extremities," by Reynell Coates, of Philadelphia, published in the 20th vol. of the *Amer. Journ. of Med. Sci.*

Following the suggestion made by Dr. Neill,[2] who uses for the same purpose a Spanish windlass, I have had the foot-block of my splint so constructed as that counter-extension may be made at the same moment with the extension. The principle is the same as that applied in the ancient glossocomon described by most of the early surgical writers. The advantages of this method are that the counter-extension, as well as the extension, can be made slowly, steadily, and firmly; the patient cannot, if disposed to interfere with the dressings, loosen or disturb them; the limb is acted upon equally in each direction, and the rollers which secure the limb to the splint do not become drawn obliquely and disarranged by the daily attempts to increase or continue the extension. The danger only is, that, in the hands of inexperienced surgeons, too much force will be applied, and perineal ulcerations ensue. (See Pl. V. Fig. 1.)

With children I often employ only the simple splint figured in Pl. V. Fig. 2, yet if the little patient is restive and disposed to throw himself about the bed, I prefer the double splint shown in Fig. 3, to which is attached a screw of peculiar construction, called the "endless screw," Pl. VI. Figs. 1, 2, 3, 4, the pattern for which was

[1] For cases of sloughing, &c., from perineal band, see N. Y. Journ. of Med., vol. xvi., 2d ser., p. 261; also same journal, vol. ii., 1st ser., p. 239.

[2] Philadelphia Med. Exam., vol. xi. p. 579.

sent to me by some gentleman in Boston, whose name, I regret to say, I cannot now recall.

In all cases one should prefer to use side splints, carefully fitted; the whole, both side and long splints, to be applied to the limb over neatly made cotton pads or junks, of which there ought to be laid upon every part of the leg and thigh as many as may be necessary to prevent unequal pressure.

To this general plan of treatment now recommended for fractures of the femur, the writer makes no exceptions, unless it be in the case of a fracture of the neck of the femur, occurring in old persons, or in fractures just above the condyles, where the direction of the fracture is obliquely downwards and forwards; in the former of which no rule can be adopted, except that the patient should be placed usually in that position which may be found most comfortable; and in the latter of which, the flexed position seems, indeed, the most rational, yet, according to the evidences furnished by Malgaigne, its advantages over the straight position are far from being established. In fractures occurring just below the trochanter minor, my own experience agrees with that of the distinguished author just quoted, that the straight position is still the best; an experience which seems to me also to admit of a satisfactory explanation. It is not directly upwards, but rather outwards and upwards, that the lower end of the proximal fragment is thrown by the action of the psoas magnus and iliacus internus, so that in order to meet the supposed indication it will be necessary to carry the lower part of the limb outwards also, a position which would certainly be found very inconvenient, if not actually impracticable in the majority of cases.

Nor can the tendency of the upper fragment to rise, and consequently to separate from the lower, be effectually met by posture alone, unless the thigh is completely flexed upon the body, a position again which will be found inconvenient, if not impossible.

It is apparent, therefore, that by posture alone we can only very imperfectly accomplish an approximation of the fragments; while we have almost entirely, whatever may be said to the contrary, deprived ourselves of all means of extension and counter-extension. On the other hand, admitting that by the straight position we have momentarily provoked a resistance which flexion of the limb might have prevented, we have, at the same time, slowly, but permanently, overcome this resistance by steady extension. In the one case, we have made a present gain, but a final loss; and in the other, a present loss results in our final gain. So it is that experience has

shown in more than one case which has come under our observation, that although for a few moments, or perhaps for several hours after the straight position has been assumed in these fractures, the upper fragment will rise spasmodically, after a time, longer or shorter, and especially after the application of the side splints and bandages, this tendency will cease altogether.

My convictions upon this subject are clear, but since they do not correspond with the convictions of a pretty large proportion of practical surgeons, I am compelled to regard the question of posture in this fracture as still open. I will take the liberty to suggest, however, that it is by the results of carefully recorded experience alone that it can ever be determined, and not by any reference to physiological or anatomical arguments; which I suspect have had hitherto much more influence with surgeons in respect to this question than personal observation.

Note.—For an ingenious mode of dressing *compound* fractures of the thigh or leg, see apparatus invented by A. Hays, of Madison, Ind., in *Trans. of Amer. Med. Assoc.*, vol. iii. p. 382.

CHAPTER XV.

FRACTURES OF THE PATELLA.

CASE 1. *Simple fracture. Perfect bony union.*

Charles Jones, æt. 5, fell on his left knee, Jan. 31, 1848, breaking off a small fragment from the upper and inner margin of the patella. It did not separate from the lower fragment, except that when the knee was bent it was thrown directly forwards, presenting to the finger a sharp point.

Dr. Flint and myself in attendance. We directed the lad to keep his leg straight, and to apply cool water dressings.

Six months from this no traces of the accident remained.

CASE 2. *Simple transverse fracture. Ligamentous union.*

Edward Laffy, æt. 20, fractured the right patella transversely, Oct. 24, 1851. Dr. Shaw, of Silver Creek, N. Y., dressed the limb

with a roller extending from the toes to the knee, and with Sir Astley Cooper's patella apparatus.

He was admitted to the Buffalo Hospital, Nov. 1, 1851, and, with slight modifications, the same dressings were continued until Nov. 26. I then removed the bandage and substituted my own splint, with adhesive plasters.

Dec. 5, I removed the splint and roller from the leg.

The fragments united by ligament; but the ligament was not more than one-quarter of an inch in length.

CASE 3. *Simple transverse fracture. Union by ligament.*

John Delaney, æt. 36, fell, March 7, 1851, about fifteen feet, striking on his head and knee, and breaking the patella transversely.

March 21, he was admitted to the hospital. I immediately applied my own patella splint, securing the foot to the foot-board with a paste gaiter, and supporting the fragments in place with a paste knee-cap.

The fragments united by ligament, being separated from each other about one-quarter of an inch.

CASE 4. *Simple fracture. Union by ligament.*

An Irish laborer, aged about 25 years, fractured the patella transversely, by falling over a dry-goods box while running at full speed. Dr. Mixer in attendance.

He was placed upon my splint—a single-inclined plane—and the patella retained in place by a strap instead of rollers.

At the request of Dr. Mixer, I saw him occasionally during the treatment.

Four months after the injury, the functions of the limb were completely restored, union of the fragments having been effected with a fibro-ligamentous tissue half an inch in length.

CASE 5. *Simple fracture. Union by ligament.*

Theophilus Alles, æt. 56, fell on the side-walk, Aug. 27, 1854, breaking the patella of the left leg. Fracture transverse and simple.

The surgeon who was employed, applied only bandages to the leg and knee. No splint was used.

Sept. 10, 1854, two weeks after the fracture occurred, he was received into the Buffalo Hospital, and the same treatment was continued.

Oct. 1, 1854, when I took charge of the wards, I found the fragments united by ligament, but separated half an inch. On the 6th, I removed all dressings.

CASE 6. *Simple transverse fracture. Union by ligament.*

James McCuen, æt. 33, fractured the left patella transversely. Dr. Mixer and myself in attendance. The splint and the other dressings were continued three weeks and three days.

After two years, I find the patella united by a ligament of half an inch in length. The limb is not quite as strong as the other.

CASE 7. *Simple transverse fracture, from muscular action. Union by ligament.*

Oct. 21, 1846, a sailor, aged about 30 years, was walking across the floor, when his heel caught in a knot-hole and threw him backwards, breaking the patella transversely. The fracture was the result of muscular action alone.

I took charge of the case, at the request of Dr. Flint, on the third or fourth day. We applied my patella splint in the usual manner.

In four weeks ligamentous union was accomplished, with a separation of the fragments to the distance of half an inch.

CASE 8. *Simple transverse fracture. Union by ligament. Abundant callus. Partial rupture of ligament.*

Wheeler, æt. 40, fractured the patella transversely. Fracture treated by Dr. Williams.

Nine weeks after the fracture occurred, I examined the knee. The patella was surrounded with bony callus, so that it was considerably wider than the other. The fragments seemed to be united by a short ligament, except on the inner side, where there was a separation or rupture of the ligament, to the extent of one-quarter of an inch. The patient explains this, by saying that the splint was removed at the end of four weeks, and that after a week more he began to walk, but that he almost immediately felt it tear or give way on the inner side.

CASES 9 AND 10. *Simple fracture of both patellas. Union by ligament.*

John Dundas, æt. 22, fell, Oct. 22, 1852, in the night, while asleep, from a window in the third story of a dwelling-house, striking with his knees upon the stone side-walk.

He was seen by Dr. Pratt, and Gibson's long thigh-splints were applied.

On the tenth day I took charge of him, at the Buffalo Hospital, and substituted my simple-inclined plane for the Gibson splint. I covered each leg from the toes upward, as far as the knee, with a paste bandage, and then, having properly cushioned the limbs, I secured the fragments in place with adhesive plaster.

Nov. 28, 1852, thirty-seven days after the fractures occurred, all dressings were removed. Both patellas had united by ligaments of about one-quarter of an inch in length.

CASE 11. *Simple transverse fracture. Occurring twice at the same point. Union by ligament.*

Carl Abend, æt. 30, fractured his left patella, Dec. 4, 1850, and again, Feb. 3, 1851.

He was admitted to the Buffalo Hospital of the Sisters of Charity, Feb. 6, 1851. The fracture was transverse, and the fragments were separated one inch. The whole limb was swollen, and as the splint had now been on the limb a great portion of the time since the first fracture, I had it removed altogether, and directed the limb to be bathed twice, daily, with cold water. This treatment was continued ten days. I then applied my own splint.

March 21, six weeks from the date of the last fracture, I removed all dressings, and found the fragments united by a ligament of one-quarter of an inch in length. (See cast in my cabinet.)

CASE 12. *Simple fracture. No union of the fragments.*

John Sharkie, æt. 24, a soldier in the British service, while serving in the East Indies, was struck on the right knee while he was in a sitting posture, with his leg bent under him.

He was immediately placed under the charge of the surgeon of the 89th Regiment of Infantry. During the first eleven days, no splints or bandages were applied, on account of the severe inflammation and swelling. A compress was then placed over both fragments, and they were bound together by rollers, &c. The whole limb was suspended on an inclined plane, the foot being made fast to a foot-board. This treatment was continued four months. When the bandages were removed, the limb was badly swollen. Immediately on removing the bandages, the upper fragments drew up towards the body. It was eighteen months before he could walk, even with the aid of a cane.

March 27, 1855, twenty-nine years after the injury was received, he was an inmate of the Buffalo Hospital, and I was permitted to examine his knee carefully.

The lower fragment is not displaced, but when the leg is straight upon the thigh, the upper fragment lies two and a half inches from the lower, and when it is flexed upon the thigh, the upper fragment is removed five inches from the lower. There is no ligament or other bond of union, so far as I can discover. He walks with very little or no halt, but he cannot walk fast.

CASE 13. *Comminuted fracture, complicated with fracture of the femur. Result imperfect.*

Dec. 27, 1853, Wm. Palmerston, of Black Rock, Erie Co., N. Y., about 25 years old, fell, and broke both his left thigh and patella. (See Case 70 of "fractures of femur.") The patella was broken, transversely, near its middle. There was also a longitudinal fracture near the inner margin.

Drs. Lewis and Dayton were in attendance. I was requested by these gentlemen to see the case on the fifth day. The femur being broken, also, our treatment was, in consequence, somewhat modified. A single straight splint was employed, and adhesive straps were laid over the patella.

On the fifty-eighth day, the splint was not yet removed from his knee, but the fragments were united.

June 3, 1854, five months after the fracture occurred, I found the fragments separated half an inch, but united by what felt like bone. There was a small loose fragment on one side, and which occasionally produced pain and swelling at that point. He had but little motion in the knee-joint, yet he was able to walk and to pursue his trade, as a carpenter, without much inconvenience.

PATELLA.

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of fractures.	TREATMENT.	RESULT. United or not.	When united.	By bone or ligament.	Remarks.	Perfect or imperfect.
1	5 y.	6 m.	M.	L.	Simple, oblique.	Straight positions.	U.		B.		P.
2	20 y.	6 w.	M.	R.	Simple, transverse.	A. Cooper's apparatus, &c.	U.	6 w.	L.	Ligame't ½ inch in length.	Imp.
3	36 y.		M.		Simple, transverse.	My own apparatus.	U.		L.	Ligame't ½ inch in length.	Imp.
4	25 y.		M.		Simple, transverse.	My own apparatus.	U.		L.	Ligame't ½ inch in length.	Imp.
5	56 y	5 w.	M.	L.	Simple, transverse.	Only bandages.	U.	5 w.	L.	Ligame't ½ inch in length.	Imp.
6	33 y.	2 y.	M.	L.	Simple, transverse.	"	U.	24 d.	L.	Ligame't ½ inch in length; limb not quite as strong as the other.	Imp.
7	30 y.	4 w.	M.		Simple, transverse by muscular action.	My own apparatus.	U.	4 w.	L.	Ligature ½ inch in length.	Imp.
8	40 y	9 w.	M.		Simple, transverse, &c.		U.	4 w.	L.	Ligament partially torn at end of 4 weeks; much callus; ligament ½ inch in length.	Imp.
9	22 y.	6 w.	M.	R.	Simple, transverse.	My own apparatus.	U.	37 d.	L.	Ligame't ½ inch in length.	Imp.
10	"	"	"	L.	" "	" "	"	"	"	" "	"
11	30 y.	4 m.	M.	L.	Simple, transverse.		U.	2 m.	L.		Imp.
"	"	2 m.	"	"	" "	My own apparatus.	U.	6 w.	L.	This was a fracture at the second point, 4 weeks after the first; it united by ligament ½ inch in length.	Imp.
12	24 y.	29 y.	M.	R.	Simple, transverse.	Single inclined plane, &c., continued 4 mos.	Not U.			Was not able to walk with a cane under 18 months; fragments separated from 2½ to 5 in., according to position of leg; walks tolerably well.	
13	25 y.	5 m	M	L.	Comminuted, complicated.	Straight splint, &c.	U.	58 d.	B.	Main fragments separated ½ inch by what feels like bone; small fragments loose; knee-joint stiff.	Imp.

ANALYSIS.

Of 13 fractures of the patella, 12 were the results of direct blows or falls upon the knee, and 1 (Case 7) was the result of muscular action alone.[1] 11 were simple, and transverse; Case 1 was a simple oblique fracture, extending only across one corner of the bone, and Case 13 was broken both transversely and longitudinally. Cases 9 and 10 were in the opposite limbs of the same person, and Case

[1] Dr. Kirkbride, of Philadelphia, has reported three cases of fracture of this bone, from muscular action; two of the cases having occurred in the opposite limbs of the same person. *Amer. Journ. of Med. Sciences*, vol. xvi. p. 330. And Dr. Hayward has reported another in vol. xxx. of the same journal, at p. 512.

11 was re-fractured at the same point after two months. All were males. 6 are recorded as having occurred in the left leg, and 3 in the right. The ages ranged from five years to fifty-six; of which 1 was under fifteen, 7 were between fifteen and thirty-one, 3 were between thirty and forty-six, and 1 was over forty-five.

All have united except Case 12. Case 1 and Case 13 have united, it is believed, by bone; while the remaining 11 have united by ligament, which in 6 cases was found to be about one-quarter of an inch in length, and in 4 cases half an inch. The shortest period at which union was known to have taken place, was twenty-four days; and the longest period, fifty-eight days—the average being thirty-eight days.

REMARKS.

Dr. Kirkbride has reported a case of ligamentous union of the patella, in which the ligament was two and a half inches long, and was attached only to the inner margins of the fracture. "He was able to walk as rapidly as ever, and without perceptible limping."[1] A similar case is reported by Dr. Watson, of New York, in which the fragments became separated three and a half inches.[2] In both instances, the fragments seemed to have united by a short ligament, which had become lengthened by premature use of the limb; in the case reported by Kirkbride, the ligament seemed to have partly torn, as in Case 8, reported by myself. Dr. Coale presented to the Boston Society for Medical Improvement, at its April meeting in 1856, a specimen of a fractured patella taken from a man sixty-five years old; the fracture having occurred ten years before. The fragments were at first so closely united that no division between them could be discovered, but now they are separated at their outer edges one inch, and at their inner edges one-eighth of an inch.[3]

Post, of New York, has reported three cases of compound fracture of the patella extending into the knee-joint, brought to a successful termination.[4]

In a case mentioned by Dr. Eve, of Augusta, occasioned by the kick of a horse, and in which amputation became necessary on the tenth day, "the knee-joint was found filled with dark grumous

[1] Amer. Journ. of Med. Sciences, vol. xvi. p. 32.
[2] N. Y. Journ. of Med. and Surgery, vol. iii. (first series) p. 366.
[3] Boston Med. and Surg. Journal, vol. liv. p. 402.
[4] New York Journ. of Med., vol. ii., 1st series, p. 367.

blood, a portion of the cartilage of the internal condyle of the os femoris was chipped off, and the patella broken into a number of fragments."[1]

TREATMENT.

Dr. Sanborne, of Lowell, Mass., has invented an ingenious mode of treating transverse fractures of the patella, and also cases of rupture of the ligamentum patellæ, which I shall take the liberty of describing in his own language.

"CASE.—While repairing one of the public buildings of this city, two men, masons by trade, were precipitated, by the breaking of a staging, a distance of twenty-five feet on to a plank floor. One of the men received a fracture of the base of the skull, and died in consequence; the other escaped with a rupture of the ligamentum patellæ. The man was conveyed home, and a neighboring physician applied the usual dressing of a 'figure of eight' bandage, with a splint behind the joint. In the course of the following night, the pain in the knee became intolerable, from the swelling and consequent tightness of the bandage, and all dressings were removed. The following day the case was transferred to my care by the attending physician. I found the knee a good deal swollen and inflamed, and there was evidence of extensive extravasation of blood into the joint and surrounding tissue. The patella was drawn up the thigh for a distance of four inches; and although it could be brought down nearly to its proper situation by the hand, a bandage sufficiently tight to keep it there could not be borne. The object to be accomplished, then, was to bring a sufficient force to bear on the patella, without making pressure on the joint or impeding the circulation of the limb. And it was accomplished in this manner: a strip of ordinary adhesive plaster, four feet long and two and a half inches wide, was applied to the limb from the upper portion of the thigh to the middle of the leg, leaving at the knee a free loop * * * *. (See Figs. 2, 3, Pl. XIV., appendix.) A roller bandage was then applied above and below the knee, for the purpose of securing the plaster, and controlling the circulation and muscular contraction. A small stick, six or eight inches in length, then being put through the loop over the knee, the plaster was twisted until the patella was brought nearly down to its proper

[1] Southern Med. and Surg. Journ., 1848; also Bost. M. J., vol. xxxvii. p. 427.

situation. Before applying the *twist*, a hand compress was placed above the edge of the patella in such a manner as to bring the force to bear directly upon that bone. * * * * Leeches and fomentations were applied to the joint; and as the inflammation subsided, the plaster was tightened, until (at about the sixth day) the bone was brought fully down to its normal situation. It was there held, without the slightest uneasiness to the patient, until union took place. In three weeks the man was able to walk alone, with the plaster still applied, and the recovery was ultimately perfect. There is now no perceptible halt in the gait.

"Within the last two years several cases of transverse fracture of the patella have been treated by this method, both by myself and others in this vicinity, and with perfect success. In the winter of 1854 I also had the pleasure of applying this dressing to a patient of Mr. Stanley's in St. Bartholomew's Hospital, London, when the simple inclined plane failed to bring the two fragments of the fractured patella together. The simplicity of the method, and its complete success, gained for it the warm approval of that distinguished surgeon."[1]

The dressing which I have usually employed in the treatment of this fracture, consists of a single inclined plane, of sufficient length to support the thigh and leg, and about six inches wider than the limb at the knee. This plane rises from a horizontal floor of the same length and breadth, and is supported at its lower end by an upright piece of board, which serves both to lift the plane and to support and steady the foot. The lower end of the inclined plane may be elevated from six to eighteen inches, according to the length of the limb and other circumstances. Upon either side, about four inches below the knee, is cut a deep notch. The foot-piece stands at right angles with the inclined plane, and not at right angles with the horizontal floor; it may be perforated with holes for the passage of tapes or bandages to secure the foot.

Having covered the apparatus with a thick and soft cushion, carefully adapted to all the irregularities of the thigh and leg, especial care being taken to fill completely the space under the knee, the whole limb is now laid upon it, and the foot secured gently to the foot-board, between which and the foot another cushion is placed.

[1] Bost. Med. and Surg. Journ., vol. liv. p. 174.

The body of the patient should also be flexed upon the thigh, so as the more effectually to flex the quadriceps femoris.

A compress made of folded cotton cloth, wide enough to cover the whole of the breadth of the knee, and long enough to extend from a point four inches above the patella to the tuberosity of the tibia, and one-quarter of an inch thick, is now placed on the front of, and above the knee. While an assistant presses down the upper fragment of the patella, the surgeon proceeds to secure it in place with bands of adhesive plaster. Each band should be two or two and a half inches wide, and sufficiently long to inclose the limb and splint obliquely. The centre of the first band is laid upon the compress partly above and partly upon the upper fragment, and its extremities are brought down so as to pass through the two notches on the side of the splint and close upon each other underneath. The second band, imbricating the first, descends a little lower upon the patella and is secured below in the same manner. The third, and so on successively until the whole extent of the compress and knee is covered, is carried more nearly at right angles around the limb and splint; the last bands passing obliquely from below upwards and backwards. The dressing is now completed by passing a cotton roller around the whole length of the limb and splint, commencing at the toes and ending at the groin. This is to be applied lightly, as its object is only to support and steady the limb upon the splint. (Fig. 4, Pl. XIV.)

The great advantage which this mode of dressing possesses, is that it does not ligate the limb completely; since, on either side, between the broad margins of the splint and the points where the straps and bandages touch the limb, there is a space, more or less considerable, against which no pressure is made, and through which the circulation may go on without impediment; so that however firmly the bands are drawn across the knee, no swelling occurs in the foot. As to its efficiency, the best testimony which can be presented, is the simple fact, that of the six cases reported as having been treated by this method, four have united by a ligament of one-quarter of an inch in length, and two by a ligament of half an inch.

The plan adopted by M. Gama, of Val de Grace,[1] is similar to that which I have now described, but the splint upon which the limb reposes is not so wide; while width is an essential point in the

[1] Malg., Traité des Fractures, etc., op. cit., p. 764.

attainment of the objects which I propose. Dr. Neill, of Philadelphia, uses also the adhesive plaster straps, but they are not placed outside of the splint.[1] Such also I understand to be Mr. Alcock's method of using the adhesive plaster.[2]

CHAPTER XVI.

TIBIA.

Upper Third.

CASE 1. *Simple transverse fracture. Result perfect.*

Mrs. W., of Buffalo, æt. 58, fell, Oct. 19, 1848, striking on her right knee, breaking the tibia just below the tuberosity. Fracture transverse. The fall was the result of a misstep on level ground, and was attended with only slight bruising of the soft parts. She says, that on attempting to rise she discovered what had happened, the bone projecting very distinctly, and she pushed and pulled it into place with her own hands.

Dr. Barnes, who was the family physician, requested me to see it on the same day. Mrs. W. was large, with a leucophlegmatic temperament. The limb was already swollen and œdematous. The fragments were in place, but motion and crepitus were distinct.

We dressed the limb by laying it on a pillow, and supporting it with two lateral splints placed outside of the pillow, and confined the limb to the pillow with tapes. About one week from this, we laid the limb over a double inclined plane. The fragments united promptly and without the slightest amount of displacement or deformity, or ensheathing callus. In six weeks all dressings were discontinued.

The neck of the femur of the same limb was broken in 1841. (See Case 16 of "fractures of femur.")

[1] Philadelphia Med. Examiner, vol. x. p. 1.

[2] Practical Observ. on Frac. of the Patella and of the Olecranon, by Thomas Alcock, p. 296.

CASE 2. *Simple transverse fracture. Result perfect.*

Peter Hamil, of Buffalo, æt. 29, was admitted to the hospital, Aug. 31, 1849, with an injury to his left leg, which had occurred two days before. A young surgeon in the city had examined the limb, and thought the femur was broken just above the joint. He had applied a roller from the toes to the thigh; and to the thigh were applied, very nicely adjusted, lateral splints. These dressings were on the limb at the time of his admission, and were not removed until the next day. I could not then discover any fracture or displacement, and the dressings were discontinued, the limb being merely laid upon pillows. After about eight days, however, when the swelling of the foot, consequent upon the bandaging, had subsided, I reapplied side splints, believing it possible that I might have overlooked a transverse fracture of the lower end of the femur. On the 26th of Sept., I discontinued them altogether.

Oct. 4, when examining the limb, I found a slipping sensation, like that produced in a false joint, through the upper end of the tibia, and I now easily understood what had been mistaken for a fracture of the femur. It was a transverse fracture through the upper end of the tibia, and without displacement. Union was delayed, perhaps owing to its not having been at all supported by splints. The knee-joint was quite stiff. No splints were afterwards applied, and on the 25th of Nov., three months after admission, he was dismissed, the motion between the fragments having ceased, but the knee still remaining quite stiff.

CASE 3. *Simple fracture. Result perfect.*

James Ellis, æt. 42, broke the tibia about two or three inches below its articulating surface. It was treated by a surgeon at Port Sarnia, C. W.

Ten weeks after the accident, he called upon me, and I found the bone united, but some bent at the seat of fracture. In all other respects it was perfect.

CASE 4. *Simple fracture. Result perfect.*

John G. Zimmerman, a citizen of Saxony, in Germany. When eight years old, he fractured the left tibia, about three inches below the knee. The fracture was examined by two surgeons, both of whom pronounced it a fracture. The fragments were movable. They applied lateral splints and bandages.

March 31, 1854, while Zimmerman was an inmate of the Buffalo Hospital, and thirty-seven years after the accident, I examined the limb, and found no traces of a fracture.

CASE 5. *Simple fracture, with displacement of head of fibula. Result imperfect.*

Robert Purcell, of Attica, N. Y., æt. 55, broke the tibia, about three inches from the knee-joint; at the same time displacing the upper end of the fibula upwards.

Dr. C., of Attica, N. Y., was employed.

Two years after the accident, I found the limb shortened one-quarter of an inch; the tibia slightly bent at the seat of fracture; the head of the fibula remaining displaced, and the limb painful when he walked much.

The same leg was broken in its middle, two years before. (See Case 14 of "fractures of tibia.")

Middle Third.

CASE 6. *Simple transverse fracture. Result perfect.*

July 6, 1849, Mrs. Lathan, of Buffalo, æt. 50, broke the left tibia near its middle. Fracture transverse, and never displaced. I dressed the limb, at first temporarily, and on the fifth day I applied a starch bandage. At the end of two months, union was complete and without displacement.

CASE 7. *Simple fracture. Result perfect.*

R. Jackson, of Buffalo, æt. 46, broke the tibia near its middle. Does not know the name of the surgeon who dressed the fracture.

Ten months after, the limb was of the same length with the other, but there was a slight forward bend at the seat of fracture, and the limb still pained him occasionally.

CASE 8. *Simple transverse fracture. Result perfect.*

George Peterson, of Buffalo, æt. 11, fractured his right tibia near its middle, June 25, 1850, by falling from a building, twenty feet. Fracture transverse, and fragments not displaced. Very large thrombus. I laid the limb simply on a pillow, until the sixth day, when I applied a paste roller. On the twenty-fifth day after the fracture, I dismissed him with a perfect cure.

Six years after, the limb was perfect.

CASE 9. *Simple fracture. Result perfect.*

George Eggleston, æt. 17, fractured the right tibia near its middle. The fracture was treated by Dr. Blair, of Rome, N. Y.

Eleven years after, when examined by myself, the limb was sound and perfect.

CASE 10. *Simple fracture. Result perfect.*

Michael Hollis, æt. 30, fractured the tibia of his left leg near its middle. Dr. Crandell, of Palmyra, treated the fracture.

Four years after, when examined by myself, the limb was perfect.

CASE 11. *Simple fracture. Result perfect.*

Wilhelm Hansikom, æt. 24, broke the tibia near the lower end of the middle third. It was dressed by Dr. Walter, of New Brandenburg, Germany. A large number of narrow splints were placed around the limb.

Jan. 8, 1856, thirty years after the accident, and while he was an inmate of the Buffalo Hospital, I examined the leg. It was in every respect perfect.

CASE 12. *Simple fracture. Result perfect.*

Harrison Webster, æt. 17, broke the tibia near its middle. Dr. Needham, of Onondaga, N. Y., treated the fracture.

Four years after the accident, the limb was perfect.

CASE 13. *Simple fracture. Result perfect.*

Jeremiah Torrey, æt. 11, broke the right tibia through its middle. Surgeon Day, of England, treated the fracture.

After sixteen years, I found the limb sound and without deformity.

CASE 14. *Compound fracture. Result perfect.*

Robert Purcell, æt. 53, fractured the tibia through the lower third. Dr. Curtis, of Attica, N. Y., was employed.

Four years after the fracture occurred, I found no traces of the fracture.

CASE 15. *Compound fracture. Result imperfect.*

Hugh Boyle, of Toronto, C. W., æt. 26. Fracture of the right tibia, near its middle. Dr. W., of Toronto, took charge of the limb.

Nine years after, he became an inmate of the Buffalo Hospital,

on account of an ulcer which had existed over the seat of fracture ever since the accident occurred.

CASE 16. *Compound fracture. Result imperfect.*

John Mahan, æt. 39. Admitted to the Buffalo Hospital, Feb. 16, 1853, with a compound fracture of the right tibia, near the middle of the leg. The bone was broken by the kick of a Dutchman. I found the limb much swollen, and very painful, and I laid it carefully over a double inclined plane, and directed cold water irrigations; I also directed morphine in full doses. The inflammation, for several days, threatened the complete loss of his limb. On the tenth day, the lower end of the upper fragment was projecting in front of the lower fragment, and I covered the angle of the splint, and made moderate pressure upon the upper fragment. On the twentieth day, the fragments were bent backwards, and I placed a compress behind. On the thirty-seventh day, we took the limb from the inclined plane, and trusted alone to side splints. On the forty-fifth day, we removed all dressings. Bone not united. Laid the limb simply on a pillow. After six days, I applied a movable gutta percha splint. Directed the limb to be bathed and rubbed every day, and allowed patient to sit up. Fifty-ninth day, he began to walk on crutches. Motion between fragments still continued. On the ninety-third day, I found a firm union, without ensheathing callus. The upper fragment is slightly in front of the lower.

CASE 17. *Compound, comminuted fracture. Result imperfect.*

Simon Cone, of Buffalo, æt. 28, broke his tibia through its middle third. Dr. H. was employed.

Seven months after the accident occurred, I removed a small fragment which had never united to the shaft. The wound had closed over, and for a long time this fragment could be felt moving under the skin, but not causing inflammation or suppuration, yet the skin over it was tender, and he wished it removed.

The leg was shortened one-quarter of an inch. I did not, however, detect any displacement of the fibula, yet it must have existed.

Lower Third.—Malleolus.

CASE 18. *Compound fracture, complicated with fracture of astragalus. Result imperfect.*

Pat. Murphy, æt. 28, admitted to the Hospital of the Sisters of Charity, Oct. 22, 1848.

"Three weeks since, his right foot was traversed by the wheel of an empty car, and badly crushed. Until received here, he had been under the care of Dr. W. of this city; and the swelling, at first very great, had been considerably reduced, and the wounds partially healed. Crepitus was distinct upon slight motion of the foot. A gutta percha splint was applied to the leg and foot, with also simple dressings to the wounds, and the whole limb was placed in a Bowen's splint.

"From this date until the 31st, the discharge of matter was profuse, and often highly offensive. He suffered much from pain and general restlessness. Night-sweats and occasional chills, also with emaciation, indicated an approach to hectic. The treatment was chiefly tonic and stimulating. Under this plan, with careful dressing and management of the leg, he gradually passed the crisis, and from about the 31st of October, more than four weeks after the accident, he slowly improved. Several fragments of bone were discharged, but when dismissed, Dec. 12th, he had tolerably free use of his ankle-joint, the wounds had healed, and he had a very useful, but not perfect limb.

"We never absolutely condemned this limb to amputation, yet, at one time, we warned him of the probability that it would soon be necessary to make this sacrifice for the safety of his life."

Lower Third.—Above Malleolus.

CASE 19. *Simple fracture. Result perfect.*

James McDonald, of Buffalo, æt. 33, fractured the right tibia about two inches above the ankle-joint. It was treated by Dr. Austin Flint, of Buffalo.

Three years afterwards, I could find no trace of the accident.

CASE 20. *Compound fracture.* (*A gunshot wound.*) *Result imperfect.*

John Thurstone, æt. 17, was shot in the left leg, breaking the tibia about two or three inches above the ankle-joint. Dr. Amasa Trowbridge, of Watertown, N. Y., was employed.

Six years after, I found the bone united with some deformity, but not shortened.

TIBIA.

UPPER THIRD.

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of fractures.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or Imperfect.
1	58 y.	6 w.	F.	R.	Simple, transverse.	Lateral splints, pillows, &c.	U.				P.
2	29 y.	3 m.	M.	L.	Simple, transverse.	Lateral splints.	U.	3 m.		Knee stiff.	P.
3	42 y.	10 w.	M.		Simple.		U.			Slight bend.	P.
4	8 y.	37 y.	M.	L.	Simple.	Lateral splints.	U.				P.
5	55 y.	2 y.	M.		Simple with dis. of fib.		U.		½ in.	Slight bend; fibula displaced.	Imp.

MIDDLE THIRD.

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of fractures.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or Imperfect.
6	50 y.	2 m.	F.	L.	Simple, transverse.	Starch bandage.	U.	2 m.			P.
7	46 y.	10 m.	M.		Simple.		U.			Slight forward bend at seat of fracture.	P.
8	11 y.	6 y.	M.	R.	Simple, transverse.	Paste bandage.	U.				P.
9	17 y.	11 y.	M.	R.	Simple.		U.				P.
10	30 y.	4 y.	M.	L.	Simple.		U.				P.
11	24 y.	30 y.	M.		Simple	Lateral splints.	U.				P.
12	17 y.	4 y.	M.		Simple.		U.				P.
13	11 y.	16 y.	M.	R.	Simple.		U.				P.
14	53 y.	4 y.	M.		Simple.		U.				P
15	26 y.	9 y.	M.	R.	Compound.		U.			Ulcer over seat of frac.	Imp.
16	39 y.	99 d.	M.	R.	Compound.	Double inclined plane, &c. &c.	U.	abt. 80 d.		Upper fragment a little in front of lower.	Imp.
17	28 y.	7 m.	M.		Compound, comminuted.		U.		½ in.	Removed a loose fragment after 7 months.	Imp

LOWER THIRD (Malleolus).

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of fractures.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or Imperfect.
18	28 y	10 w.	M.	R.	Compound, complicated.	Bowen's splint, &c. &c.	U.			Several fragments of bone discharged.	Imp.

LOWER THIRD (Above Malleolus).

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of fractures.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or Imperfect.
19	33 y.	3 y.	M.	R.	Simple.		U.				P.
20	17 y.	6 y.	M.	L.	Compound.		U.			Slight deformity.	Imp.

ANALYSIS.

Of 20 fractures of the tibia, 5 belong to the upper third, 17 to the middle third, and 3 to the lower third: of which latter, 1 was a fracture of the malleolus. Of the whole number, 15 were simple, and 5 more or less complicated. Of these simple fractures, 4 were known to be transverse. 2 of the transverse fractures occurred in the upper third, and 2 in the middle third; so that the transverse fractures in the upper third stand in the proportion of two to five, and in the middle third, of two to seventeen. All of the simple

fractures are recorded as perfect: and all of those having complications, as imperfect. A shortening of one-quarter of an inch occurred in but two instances, in both of which the fibula is believed to have been slightly displaced at one of its articulations. A slight forward inclination of the lower end of the upper fragment is mentioned twice; and in three other cases a slight deviation of the line of the bone is mentioned, but its direction is not noticed. Twice fragments of bone exfoliated, or were removed, and once an ulcer had existed over the point of fracture nine years.

18 were males, and 2 females. 8 are known to have occurred in the right leg, and 5 in the left.

The treatment has generally consisted in the application of light lateral splints, with simple dressings.

It scarcely seems necessary, where the principles of treatment are so obvious, and the results are almost always so satisfactory, to make any suggestions as to the proper modes of dressing: and especially since, whatever difficulties may present themselves, they are not so peculiar but that the remarks we shall hereafter have occasion to make on the subject of fractures of both bones of the leg, will equally apply to these cases.

CHAPTER XVII.

FIBULA.

(I have no cases of fracture of the upper third to report.)

Middle Third.

CASE 1. *Simple fracture, with dislocation of tibia inwards. Result imperfect.*

J. L. B., of Utica, æt. 12; by the kick of a horse his left tibia was dislocated inwards, and the fibula broken five inches above its lower end. Dr. F., of Cazenovia, reduced the bones.

After two years, the tibia remains slightly displaced inwards, and the fibula rests against the tibia at the seat of fracture. The

motions of the limb are unimpaired, and its usefulness in no way diminished.

CASE 2. *Compound fracture, with dislocation of tibia inwards. Result nearly perfect.*

Robert Campbell, æt. 20, fractured the fibula of his left leg near its middle. Fracture compound, and complicated with an inward dislocation of the tibia. Dr. Wilson, of Providence, R. I., was employed.

Five years after the injury was received, I found the limb sound, and nearly perfect.

CASE 3. *Compound fracture, with dislocation of tibia inwards. Result perfect.*

Harrington Whiton, æt. 14, fractured the left fibula near its middle. The tibia was at the same time partially dislocated inwards.

Twenty-eight years after, I could not discover any trace of the injury.

Lower Third.

CASE 4. *Simple fracture. Result perfect.*

E. T. Bacchus, æt. 40, broke left fibula near the ankle, Dec. 7, 1836. Mr. B. is a farmer, and was, at the time of the accident, in excellent health. He was walking upon an icy side-walk, when his foot slipped, and he fell, breaking his leg by the fall.

I applied within an hour, Dupuytren's splint along the inside of his leg, and sent him home.

Six months after, his limb was sound and without deformity.

CASE 5. *Simple fracture. Result perfect.*

Robert Purcell, of Attica, æt. 57, fell from a scaffolding and fractured the fibula, about two inches above the ankle. Dr. Curtis, of Attica, in attendance. Active inflammation followed.

Four weeks after the accident, he called upon me, and I found the bone firmly united. I could not at this time detect any deformity, but Dr. Curtis has since informed me that he thinks a slight deformity ensued.

This gentleman has had one of his legs broken twice before, and in each instance the fractures were treated by Dr. Curtis, and united without deformity.

CASE 6. *Simple fracture. Result perfect.*

Charles Billings, of Buffalo, æt. 34, fractured the left fibula, about three inches above its lower end. It was treated by Dr. Chapin, of Buffalo, N. Y.

Fourteen years after the accident, the limb was perfect.

CASE 7. *Simple fracture. Result perfect.*

Isaac Stafford, æt. 34, broke the left fibula, in its lower third. Dr. Low, of Guilderland, N. Y., dressed the limb.

Twenty-four years after the accident, I could not detect any traces of the fracture.

CASE 8. *Simple fracture. Result perfect.*

Frank Whalin, æt. 26, fell from a scaffolding, July 29, 1853, breaking the right fibula, three inches above the ankle. I applied Dupuytren's splint, secured with a starch bandage.

He died in May, 1854, and at this time the limb seemed perfect. He had walked for many months without any appearance of halt or lameness.

CASE 9. *Simple fracture. Result perfect.*

Michael Schenlin, of Buffalo, æt. 25. Jan. 20, 1855, a heavy gate fell upon the outside of his left leg, breaking the fibula, three and a half inches above the ankle. No surgeon was called until the 23d, three days after the accident. The limb was then much swollen. I could not feel the fibula sufficiently to determine whether the fragments were displaced, but crepitus was distinct.

I directed no applications, except cold water irrigations. On the seventh day, the swelling had subsided. Fragments in line, but not united.

This patient recovered in about six weeks, without either lameness or deformity.

CASE 10. *Simple fracture, with partial dislocation of tibia inwards. Result perfect.*

Mrs. Catharine Jordan, of Buffalo, aged 60 years. Mrs. J. fell on the side-walk, producing a partial dislocation inwards of the left tibia, and a fracture of the fibula.

The fracture of the fibula could not be felt, nor could I detect crepitus, but its existence was assumed, from the great degree of flexibility about the joint.

The tibia was easily restored to place, and the leg was dressed with Dupuytren's splint. Two months after the injury was received, it was firm and perfect.

CASE 11. *Simple fracture. Result imperfect.*

James Shepard, æt. 20, fractured the fibula of his right leg, about two inches above its lower end.

Dr. McBeth, of Erie Co., was employed.

Four years after, I found the foot slightly turned out, and there remained considerable bony enlargement around the seat of fracture. The fibula had united, bent inwards towards the tibia. The motions of the joint were free and perfect.

CASE 12. *Simple fracture. Result imperfect.*

John Sanford, of Schenectady, æt. 32, fractured his left fibula, about two inches above its lower end. Dr. Day, of Schenectady, was employed.

I examined the limb, twenty years after, and found some deformity remaining. It occasionally swells and becomes painful.

CASE 13. *Simple fracture, with dislocation of tibia inwards. Result nearly perfect.*

Charles Sauer, of Buffalo, aged about 30 years; while carrying a weight upon his shoulders, slipped upon the side-walk and fell, dislocating the left ankle, and fracturing the fibula four inches from its lower end. I was in attendance soon after the accident occurred, and reduced the dislocation by very moderate extension, made with my hands. The leg was flexed upon the thigh, while extension was made at the foot. We applied Dupuytren's splint. Only moderate inflammation followed, and the limb was free from all anchylosis six weeks after the injury was received.

About two years after, Aug. 2, 1856, I examined the limb, and found that the ankle-joint remained larger than the other, and that occasionally it became considerably swollen and somewhat painful. The malleolus internus does not project at all unnaturally, nor does the foot turn out. The fibula is united in perfect line, the fragments not inclining in either direction.

CASE 14. *Simple fracture, with dislocation of tibia inwards. Result imperfect.*

Jonathan Robinson, æt. 32, dislocated the lower end of the tibia

inwards, breaking the fibula about two or three inches above the ankle.

Dr. H., of Lancaster, N. Y., reduced the dislocation and treated the fracture.

I examined the leg twelve weeks after, and found the tibia remaining slightly displaced inwards, and the fibula bent inwards, towards the tibia, at the seat of fracture. The ankle was much swollen.

CASE 15. *Simple fracture, with dislocation of tibia inwards. Result imperfect.*

—— Terry, of Mount Morris, aged about 35 years. The accident occurred in stepping forwards from a canal boat upon an irregular surface.

Dr. S., of Lockport, immediately reduced the bones and applied Dupuytren's splint. He subsequently came under my care in Buffalo. The inflammation consequent upon the injury soon made it necessary to remove the splint. He left me at the end of five weeks with the fracture united, and the swelling nearly dispersed, but with considerable stiffness in the joint, and with some slight projection of the malleolus internus.

CASE 16. *Simple fracture, and inward displacement of tibia. Result imperfect.*

Philip Carey, of Ireland, æt. 22, fell with his left leg under him, and in this situation another man fell upon him, breaking the fibula of this leg about three or four inches above the ankle-joint, and displacing the tibia inwards.

An Irish bonesetter reduced the dislocation, and treated the fracture. No splints were applied. He was confined to his bed six weeks.

Twenty years after this, while he was an inmate of the Buffalo Hospital, March 30, 1855, I examined the leg.

The fibula is united with the ends of the fragments displaced; the lower end of the upper fragment being behind the upper end of the lower. The motions of the ankle-joint are not free, and it is occasionally painful when too much exercised.

CASE 17. *Simple fracture of external malleolus, with partial inward displacement of tibia. Result imperfect.*

Abel Godard, of Dansville, æt. 21, partially dislocated the tibia

inwards, fracturing also the malleolus externus. Dr. R., of Danville, N. Y., was employed.

Eight months after the accident occurred, I found the tibia remaining slightly displaced, and the lower fragment of the fibula carried downwards.

CASE 18. *Simple fracture, with partial outward displacement of tibia. Result imperfect.*

L. I. Barrows, of Utica, æt. 12, was kicked by a horse, breaking the radius of the left arm, and also at the same time the left fibula, four or five inches above the ankle. The tibia was also slightly displaced outwards.

Ten years after the accident, while he was a student of medicine, I examined the limb. The tibia still remained somewhat displaced outwards, and the fibula was bent in against the tibia at the seat of fracture. The functions of the limb were unimpaired.

Dr. F., of Cazenovia, was his surgical attendant.

CASE 19. *Simple fracture of the fibula, complicated with a compound, consecutive dislocation of the tibia forwards. Result imperfect.*

Michael McLaughlin, aged 35 years, of Buffalo. A heavy bar of iron fell upon McLaughlin's instep, resulting in violent inflammation and a sloughing of all the structures in front of the ankle-joint. The fibula was broken near its lower end by the same accident.

Dr. P., of Buffalo, was employed, and treated the case with light splints, but with his attention directed chiefly to the prevention of inflammation. Fifteen days after the injury was received I saw the patient with Dr. P. No displacement of the bone had yet occurred. Subsequently he became an inmate of the hospital and remained under my care until he was dismissed.

When the slough separated, the tibia began gradually to abandon its socket and to slide forwards, and this notwithstanding our constant efforts to retain it in place. A small piece of the front and lower end of the tibia at length exfoliated, and from this time the closure of the wound advanced rapidly. We were now able by the careful application of dressings with compresses, to gradually return the bone to its place, and when the wound had completely healed, the tibia was again restored to position. About six months elapsed before the cure was complete. No deformity then remained, but the ankle was partially anchylosed.

FIBULA.

MIDDLE THIRD.

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of fractures.	TREATMENT.	RESULT. United or not.	RESULT. When united.	RESULT. Amount of shortening.	RESULT. Remarks.	RESULT. Perfect or imperfect.
1	12 y.	2 y.	M.	L.	Simple, with disloc. of tibia inwards.		U.			Tibia slightly inclined in, and fibula rests against tibia; motions unimpaired.	Imp.
2	20 y.	5 y.	M.	L.	Compound, with disloc. of tibia inwards.		U.				P.
3	14 y.	28 y.	M.	L.	Compound, with disloc of tibia inwards.		U.				P.

LOWER THIRD.

4	40 y.	6 m.	M.	L.	Simple.	Dupuytren's splint.	U.				P.
5	57 y.	4 w.	M.		Simple.		U.				P.
6	34 y.	4 y.	M.	L.	Simple.		U.				P.
7	34 y.	24 y.	M.	L.	Simple.		U.				P.
8	26 y.	9 m.	M.	R.	Simple.	Dupuytren's splint, &c.	U.				P.
9	25 y.	6 w.	M.	L.	Simple.	Cold water dressings.	U.				P.
10	60 y.	2 m.	F.	L.	Simple, with disloc. of tibia inwards.	Dupuytren's splint.	U.				P.
11	20 y.	4 y.	M.	R.	Simple.		U.			Foot inclined out; fibula falls against tibia; motions of joint perfect.	Imp.
12	32 y.	20 y.	M.	L.	Simple.		U.			Occasionally swells.	Imp.
13	30 y.	2 y.	M.	L.	Simple, dislocation of tibia inwards.	Dupuytren's splint.	U.			After 2 years, occasionally swells.	Imp.
14	32 y.	3 m.	M.		Simple, dislocation of tibia inwards.		U.			Tibia slightly displaced in, and fibula falls against tibia.	Imp.
15	35 y.	5 w.	M.		Simple, dislocation of tibia inwards.	Dupuytren's splint.	U.			Slight projection of mal. inter.	Imp.
16	22 y.	20 y.	M.	L.	Simple, dislocation of tibia inwards.		U.			Upper fragment of fibula behind lower; ankle stiff, &c.	Imp.
17	21 y.	8 m.	M.		Simple, external., dislocation of tibia inwards.		U.			Lower fragment of fibula carried down; slight projection of mal. inter.	Imp.
18	12 y.	10 y.	M.	L.	Simple, dislocation of tibia outwards.		U.			Fragments of fibula fall against tibia; ankle not stiff.	Imp.
19	35 y.	6 m.	M.		Simple, dislocation of tibia forwards.		U.			Exfoliation of bone; ankle stiff.	Imp.

ANALYSIS.

Of 19 fractures of the fibula, 3 occurred in the middle third, and 16 in the lower third. I have no record of a fracture of the fibula alone in the upper third; indeed, in no case has the fracture been noticed at a point above the middle of the bone.

Of those broken in the lower third, 1 was a fracture of the malleolus, 10 were broken from two to four inches above the lower end of the bone, 1 at five inches above, 2 are mentioned as being near the ankle, and of the remaining 5, the exact point of fracture is not mentioned.

9 are known to have been attended, at the time of the accident, with a partial inward displacement of the lower end of the tibia, 1 with an outward displacement, and 1 with a consecutive forward displacement. Whether any displacement of the tibia existed, immediately after the receipt of the injury, in the remaining 8 cases, I do not know.

In reference to the causes of these accidents, 4 were produced by blows received upon the outside of the ankle, 1 by a blow in front, 3 by falls directly upon the bottom of the foot, and 4 by falls upon the side-walk, in which the foot was probably turned out. The 5 first were causes operating directly, and the 7 last, causes operating indirectly.

All were simple fractures, except Cases 2 and 3. All but one occurred in males. 12 are known to have occurred in the left leg, and two in the right. For this unusual disproportion, I find no other explanation, except that as the majority of these accidents seem to be produced by a sudden inversion, or eversion of the foot, the left ankle being usually the weakest of the two, is most liable to be thus displaced. Possibly the fact here noticed, may be a mere accidental coincidence, which an analysis of a larger number of cases would reverse; indeed, Dupuytren, in an analysis of 207 cases of fracture of the fibula, found that $\frac{7}{10}$, more than two-thirds, occurred in the right leg.

For an interesting discussion of the manner in which these fractures are produced, see *Malgaigne*, op. cit., vol. i. pp. 805–13.

The ages ranged from 12 years to 60, and averaged 29. Malgaigne never saw this fracture in a patient under 15 years.

5 were treated by Dupuytren's splint. All have united; 9 without any, and 10 with more or less deformity, or other imperfection. In 5 cases, the lower end of the tibia remains slightly displaced inwards, or is unusually prominent on the inner side, and the foot inclines a little outwards. In four cases, the fragments of the fibula have united, resting against the tibia, at the point of fracture, in 3 of which, it is noticed that the motions of the ankle-joint are not impaired; a fact which ought to be received as evidence of the incorrectness of the opinion held by Dupuytren, that the stiffness

of the ankle, which so often follows these accidents, was due alone to a displacement of the lower end of the fibula, and which he claimed would not follow where his own dressing had been properly applied. As bearing also upon this point, see vol. ix. p. 168, of the *Transactions* of this Society, part second, of this report.

In 4 cases, more or less stiffness of the ankle-joint remained; in Case 19, after six months; in Case 13, after two years, it was occasionally swollen and stiff; in Case 12, after twenty years, it was also occasionally swollen and stiff; and in Case 16, after twenty years, it remained constantly quite stiff.

TREATMENT.

Since a lateral displacement of the lower end of the tibia, or a lateral rotation of the foot upon the tibia, occurs in so large a proportion of fractures of the fibula, their treatment can scarcely be considered separately. I shall, therefore, content myself in what I have to say upon this subject, by a reproduction of a part of my "Report on Dislocations," published in *Transactions of the Medical Society of the State of New York*, for 1855, pp. 89–90.

"In every instance, the dislocation of the tibia inwards has been accompanied with a fracture of either the fibula or of the malleolus internus, or of both. I think, however, I have seen two or three inward dislocations of the tibia without a fracture, but I find no record of such cases, nor does my memory enable me to recall them.

"In classifying dislocations of the ankle, I have adopted the usual nomenclature, and have named all those dislocations in which the tibia projects inwards from the foot, 'inward dislocations of the tibia,' yet I have some doubts as to the propriety of this appellation. This accident seems to me to have been in general rather a lateral *rotation* of the foot upon the lower articulating surfaces of the tibia and fibula. Of all the ginglimoid joints, the ankle approaches most nearly in form to a ball and socket joint, in consequence especially of the marked prolongations of the malleolus internus and externus. In other ginglimoid articulations lateral displacements are not unfrequent, but lateral rotation can scarcely by any accident occur. Here, however, the reverse holds true; lateral displacement is difficult, while lateral rotation is comparatively easy of accomplishment.

"The majority of cases which occur involving a disturbance of

the relative position of the ankle-joint surfaces, are, I am satisfied, of this latter character, viz., lateral rotations within the capsule, rather than true dislocations; and although the restoration of the joint surfaces to position is, in general, easily accomplished; yet, in consequence of either a fracture of the fibula, or malleolus internus, or of a rupture of the internal lateral ligaments, it will almost always happen that some deformity will remain. The fragments of the fibula will fall inwards towards the tibia, and the foot, unsupported by either its fibula or its internal ligaments, will incline perceptibly outwards. Nor can this be prevented, usually, by any mechanical contrivance. Indeed, it would be easy to demonstrate, as I have often done to my pupils, that even Dupuytren's splint, usually employed in this accident, must fail of success in a great majority of cases; since the subsequent deformity is due, less to the fracture of the fibula and its consequent displacement, than to the loss of the internal ligaments, which loss nature can seldom fully repair. The whole apparatus of the joint has suffered greatly, and its form and functions, therefore, are not likely to be completely restored, whether the fibula has participated in the injury or not.

"If, however, it were true that a fracture and displacement of the fibula is the sole, or essential cause of the subsequent deformity, it would still be found generally impracticable to avoid the maiming, since it would still remain impossible to lift the broken ends from the tibia, against which, or in the direction towards which, they are so prone to fall. Inversion of the foot does not accomplish it, nor have I ever been able to make anything but the most trivial impression upon the upper end of the lower fragment by pressure upon the lower extremity of the fibula.

"I think too much confidence has been placed in the efficiency of 'Dupuytren's splint.' I believe, indeed, that this splint ought generally to be preferred as a means of support and retention, after this accident; but I doubt whether it is able to accomplish more than a moiety of all that its illustrious inventor proposed.

"In two, only, of all the cases reported, am I quite certain that there was an actual internal displacement of the tibia upon the astragalus (4 and 5); but even in these cases it seems probable that the displacement was not complete, but that a small portion of the articular surface of the tibia continued to rest upon the astragalus. In neither of these instances was reduction ever accomplished. The cause of this failure I am unable to explain."

CHAPTER XVIII.

TIBIA AND FIBULA.

Upper Third.

CASE 1. *Simple fracture. Result perfect.*

May 23, 1851, a man employed on a steamboat, broke both bones of his leg, below the knee. The tibia was broken just below the tuberosity. He was about 25 years old. A German physician first examined the limb, but did not discover any fracture. On the eighth day, he was seen by Dr. M. and myself. Motion and crepitus were then distinct, but the fragments of the tibia were not displaced. We applied a gutta percha splint, and he recovered in the usual time, and without deformity.

CASE 2. *Simple fracture. Result imperfect.*

Elias Tozer, æt. 21, fractured both bones of the leg about three or four inches below the knee. Drs. B. and S., of Ohio, took charge of the case.

Five years after, I measured the limb and found it shortened, by over-riding of the fragments, five-eighths of an inch.

CASE 3. *Simple fracture. Result imperfect.*

Tim. Logan, of New York. Simple fracture, near the lower end of the upper third. He was treated at the New York City Hospital.

I saw him soon after union of the fragments had occurred. The leg was shortened half an inch.

CASE 4. *Simple fracture. Delayed union. Result imperfect.*

F. C. Trask, of Erie Co., N. Y., æt. 35, broke his right leg, in jumping from a buggy, in June, 1852. Fractures oblique in both bones: near the lower end of the upper third: simple. Drs. S. and A., in attendance.

The limb was dressed with lateral splints, made of white wood, and with compresses and bandages, and then laid upon a pillow.

Eight weeks after the fracture had occurred, the gentleman wished me to see the limb with them. I found Mr. Trask still in bed, and the fragments not at all united.

Mr. Trask had enjoyed average health heretofore, but he was never very robust. When I was called to see him he looked pale: his skin was cold and moist; his pulse 120, and his appetite poor. The broken leg and foot were greatly swollen. The swelling was œdematous. Considerable excoriations existed on the back of the leg. The fragments were quite movable, and were overlapped three-quarters of an inch.

We agreed that the patient ought as soon as possible be got out of bed, so as to enable him to recover his strength, which had sadly declined. To this end, a gutta percha splint was made to fit accurately the whole length of the leg; and having attached a large number of tapes, it was to be secured upon the limb. Several times each day it was to be removed, and the limb bathed with brandy and water. Slowly also the limb was to be brought down to the floor, and the patient be made to sit up, and as soon as possible, he was to walk with crutches, or to ride.

Nov. 4, 1852, Mr. Trask visited me at Buffalo. The directions had been followed implicitly. About two weeks after my visit, he rode out, and in about nine weeks, or seventeen weeks from the time of the fracture, the bones were found united. His health and strength were quite restored, and the limb was no longer œdematous. It is straight, or with only a slight projection of the upper fragment in front of the lower, and it is shortened three-quarters of an inch.

CASE 5. *Simple fracture. Result imperfect.*

James Kelly, æt. 39. Simple fracture of right leg, between three and four inches below the knee-joint.

The limb was dressed by a surgeon in Ireland.

Six years after, Nov. 7, 1853, I found the limb shortened one inch and a half, and much bent backwards at the seat of fracture. Knee partly anchylosed.

CASE 6. *Compound fracture. Result uncertain.*

Frank Goodrich, of Buffalo, aged about 30 years, broke his left leg, near the lower end of the upper third. The integuments were penetrated and much bruised.

I was called on the same day, Aug. 25, 1847, and proceeded im-

mediately to dress the fractures. The fragments were easily replaced, but they did not support each other sufficiently to prevent a shortening when allowed to take care of themselves.

I dressed the wounds in a simple manner, and then applied first a flannel roller, and over this felt splints, secured with additional turns of the roller. The limb was laid over Post's double inclined plane, and so secured to the foot-piece as to make moderate extension.

On the fortieth day, all dressings were removed, and the limb was firm, straight, and of the same length as the other. The other leg had been broken some years before. (See Case 7.)

CASE 7. *Simple comminuted fracture. Result uncertain.*

Frank Goodrich, aged about 25 years, was thrown from a horse, breaking his right leg, four inches below the knee, near the middle, and again near the ankle. The fracture was treated by Drs. S. and B., of Buffalo.

Five years after, I find the limb quite straight, but the several points at which he says the fractures occurred, are tender, and present irregularities, which confirm the patient's statements. It is probable that the limb is shortened, but as the other leg was broken when I examined this leg, I could not determine. (See Case 6.)

CASE 8. *Compound fracture. Result imperfect.*

Joseph Roach, æt. 34, broke his leg, near the lower end of the upper third. Dr. P., of Lagrange, N. Y., was employed. Fracture compound.

Eight years after the date of the accident, the leg was shortened three-quarters of an inch, and very much bent at the seat of fracture.

CASE 9. *Compound comminuted fracture. Result imperfect.*

Rossel B. Davis, of Versailles, Cattaraugus Co., N. Y., æt. 50. June 1, 1854, he was kicked by a horse while sitting in his wagon, and immediately thrown out.

Drs. E. and B. were immediately called, and dressed the limb.

June 2. I met these gentlemen in consultation. I found the tibia had been broken four inches below the joint. We could not determine where the fibula was broken, but believed to be near the same point. Dr. Ellis had removed five fragments of bone, and had left other fragments whose attachments to the soft parts underneath

rendered their removal difficult. They then laid the limb upon a well cushioned board, and applied a many-tailed bandage and side splints. It had bled constantly for twenty-four hours, from two wounds, each of which seemed to be made by the corks of the horse's shoe.

I made very little change in the treatment, except to place the limb in a box. Cool water dressings were directed, and after a few days, it was advised to fill the box with bran.

At the end of four weeks, there was no union, and the leg was shortened one inch. Extension was then applied, and July 20, the starch bandage was added.

Aug. 6, tolerably firm union had occurred, and the limb was shortened only three-quarters of an inch. Since then several fragments of bone have escaped.

April 1, 1855, he was about his farm.

Oct. 6, 1856. He still walks with a slight halt.

Middle Third.

CASE 10. *Simple fracture. Result perfect.*

Walter Redmond, of Buffalo, æt. 38, was admitted to the Buffalo Charity Hospital, with a fracture of both bones of the leg, a little below the middle, Dec. 15, 1851. Fracture occurred three days before admission, in consequence of a fall upon the side-walk.

I applied a paste bandage, on the 17th of Dec., and Jan. 17th, 1852, I removed all dressings. The fragments were united without either shortening or perceptible deformity. A small amount of ensheathing callus at the seat of fracture.

CASE 11. *Simple fracture. Result perfect.*

John Maloney, æt. 16, was admitted to the Buffalo Hospital, with a fracture of both bones of the leg, near the middle. Fracture simple. Bones never displaced.

It united in the usual time, without shortening or deformity.

CASE 12. *Simple fracture. Result perfect.*

Thomas Cassody, æt. 17, admitted to the Buffalo Hospital, Oct. 7, 1853, with an oblique, simple fracture of the left leg, in its middle third. The accident occurred the day before admission, from a blow with a piece of wood. It was dressed by a physician in town, with a roller and side splints.

Oct. 8, I removed the dressings, and laid the limb over a double inclined plane, making some extension by means of a paste gaiter. The limb was swollen at the seat of fracture.

Oct. 9. Opened the dressings.

Oct. 16. Renewed the dressings. No union. No ensheathing callus.

Oct. 19, removed limb from double inclined plane, applied paste bandage.

Nov. 7. Union incomplete. Removed all dressings. Laid limb on a pillow, and directed cold water baths.

Nov. 17. Union complete. No ensheathing callus. No shortening or deformity.

CASE 13. *Simple fracture. Result perfect.*

Edward Evans, of Buffalo, æt. 10, fractured the left leg, near its middle. Dr. C., of Buffalo, was employed.

Fifteen years after the accident occurred, the limb was perfect.

CASE 14. *Simple fracture. Result perfect.*

Wm. McCormick, of Buffalo, æt. 19, broke both tibia and fibula, near their middle. Fracture simple and transverse.

I applied a paste roller. The fragments united, without shortening or deformity.

CASE 15. *Simple fracture. Result perfect.*

Joseph Werner, æt. 15, was caught under a load of wood, which was capsized, Sept. 24, 1852, breaking the left tibia obliquely, near its middle. Crepitus and motion distinct. I think the fibula was broken also, but I cannot say positively, since I could not feel any crepitus or motion which could be clearly charged to it. The general mobility of the limb, however, and the severity of the injury, seemed to imply a fracture of the fibula.

I dressed the limb with a gutta percha splint, and laid it upon a double inclined plane.

On the sixteenth day, motion was distinct between the fragments. Removed double inclined plane, under the belief that the position increased the liability to motion between the fragments. Continued side splints, and laid the leg on a pillow.

On the twenty-first day, union had occurred, but the limb was slightly bent at seat of fracture. The fragments were displaced outwards. As the callus was still flexible, I laid the limb again

upon the double inclined plane, and used some force to straighten the fragments. This procedure was successful, and did not hurt him but very little.

On the twenty-seventh day, in presence of Dr. Bowen, I removed all dressings. No shortening; no deformity; very slight ensheathing callus. Reapplied side splints only.

CASE 16. *Simple fracture. Result perfect.*

John Stancleft, of Buffalo, æt. 20, was struck by the boom of his vessel, breaking both bones of one leg, near the lower end of the middle third. The accident occurred Nov. 12, 1854, and he was brought to the hospital, and placed under the care of Dr. W., marine surgeon, Nov. 13.

I saw him repeatedly during the progress of the cure. The fragments were united on the twenty-second day, and I could not discover, at any time, ensheathing callus.

Oct. 18, 1856. The limb was neither shortened, nor in any manner deformed. The ankle, however, was occasionally painful.

CASE 17. *Simple fracture. Result perfect.*

Thomas Ryan, æt. 31. While walking on the railroad track, Jan. 28, 1854, he slipped and fell, the back of his right leg coming upon the iron rail, and breaking it at a point, I think, rather below the middle. The fracture was simple.

On the following day he was brought to the hospital, the limb not having yet been seen by a surgeon, or dressed. I found the fragments not displaced, and the limb very little swollen.

We laid the limb upon a pillow, and having folded the pillow around its sides, we laid along, outside of the pillow, two wooden splints, and these were secured in places by strips of bandage tied over the pillow and splints together. The foot was also carefully supported.

On the fourth day, Dr. Pupikofer, the intelligent house surgeon, applied a paste bandage to the whole limb.

March 10, six weeks from the date of the fracture, all dressings were laid off. The bones were firmly united, and without ensheathing callus. The limb was neither shortened nor deformed.

CASE 18. *Simple fracture. Result perfect, according to my notes; but subsequently found by another surgeon to be shortened, &c.*

Joseph Beyer, æt. 70. A heavy stone fell against his left leg,

Aug. 30, 1854, breaking both bones near the middle. Fracture simple.

I do not know who had charge of him at first, but on the eighth day he was brought to the Buffalo Hospital, during the service of Dr. W. Beyer says the fragments were never displaced. Side splints, &c., were applied.

Oct. 1, 1854, when I took charge of the limb, four weeks and five days after the occurrence of the fracture, bony union was complete, and I removed all dressings. On measuring the limb, I could not detect any shortening, nor could I discover any displacement of the fragments. I find, however, a note made subsequently by the house surgeon, to the effect that the limb was shortened one-quarter of an inch, and that the lower fragment was advanced slightly in front of the upper, so as to interrupt the anterior line of the spine of the tibia. There was no ensheathing callus, he also adds.

CASE 19. *Simple fracture. Result perfect, except that an ulcer exists over the seat of fracture.*

Michael Gallaghar, æt. 63, fell through a hole in the floor, breaking his leg near the lower end of the middle third. Dr. W., of Detroit, was employed. In four months he was able to walk.

Jan. 1856, about twenty months after the accident, he was received into the Buffalo Hospital, for an irritable and large ulcer, situated over the point of fracture. He says that during the progress of the cure a blood blister formed over the fracture, and that it soon formed an ulcer, which has never healed.

The limb is neither shortened nor deformed.

CASE 20. *Simple fracture. Result perfect.*

Henry Simpson, of Buffalo, æt. 30, was kicked violently by a man with whom he was wrestling, breaking the tibia and fibula of the left leg near the lower end of the middle third. This occurred April 27, 1853, and I was immediately called. The limb was already a good deal swollen over the seat of fracture, but I was able to detect crepitus and motion in both the tibia and fibula; there was, however, no perceptible displacement of the tibia.

I applied my lateral splints, and laid the limb upon a pillow.

May 13, I examined the limb and found the fragments not yet united. No ensheathing callus. A paste bandage was substituted for the side splints.

June 2. The paste bandage was opened. Union of fragments complete. No ensheathing callus, and the limb not shortened or in any manner deformed.

CASE 21. *Simple fracture. Result perfect.*

John Heisler, 151 Oak Street, Buffalo, æt. 14, fell on the side-walk, Jan. 13, 1854, breaking his left leg six inches above the ankle. The fracture was simple, and the tibia was broken transversely; fragments not displaced.

I dressed the limb with a paste bandage.

Feb. 22, the bones were united and I could not detect any ensheathing callus. The limb was in all respects perfect.

CASE 22. *Simple fracture from muscular action. Result perfect.*

F. Young, æt. 41, fell in March, 1855, while walking upon a slippery side-walk, breaking the left leg near its middle. He thinks the leg broke before he struck the ground. Fracture simple and oblique.

Dr. Nelson, of Buffalo, was called, and dressed the limb with moulded copper side splints, laying the limb upon its side. On the third day Dr. N. requested me to see the patient with him. The fragments were then in place, nor had they ever been much displaced; yet motion and crepitus were distinct. The treatment was not changed. Three months later, the limb was well and in all respects as before.

CASE 23. *Simple fracture. Result imperfect.*

Wm. Baker, æt. 38, fractured his leg in Sept., 1852, and was taken to the Erie County Almshouse. His health was good previous to the accident. The fracture was simple, and in the middle third. Drs. F. and W. had charge of the limb.

Eight months after the accident occurred, he was unable to walk except with crutches, owing to the swelling and soreness about the ankle-joint and foot. The leg was shortened half an inch. The upper end of the lower fragment of the tibia now projects forwards slightly, and over-rides the lower end of the upper fragment.

During a part of the time, it had been treated with the paste bandage.

CASE 24. *Simple fracture. Result imperfect.*

Mary Jane Carney, æt. 18. Admitted to the Hospital of the Sis-

ters of Charity—Dr. W.'s service—Sept. 19, 1853, with a fracture of the leg in its middle third. Fracture simple and oblique. The accident had occurred two days before by being thrown down upon the side-walk. Dr. R., of Buffalo, had first dressed the limb.

Oct. 1, when I took charge of the ward, the limb had been dressed only two days before, and I saw no occasion to disturb it.

Oct. 8, I removed the dressings, and found the limb shortened three-quarters of an inch. Fragments partially united. No ensheathing callus. I dressed the limb with a paste bandage and with splints of pasteboard.

Oct. 18. Opened the dressings. Union not complete. No ensheathing callus.

Nov. 6. Removed dressings entirely. Union complete. Shortening same as when I first took charge of the case. The upper fragment was a little in front of the lower. No ensheathing callus. I permitted her now to walk with crutches.

CASE 25. *Simple fracture. Result imperfect.*

J. C., of Buffalo, aged about 25 years, had his leg broken by the falling of a heavy plank upon it, Feb. 25, 1854. The fracture in the tibia was oblique, and about six inches above the ankle. The fibula was also certainly broken, but at what point, I could not determine. The plank struck also upon the back of his neck and produced a concussion of the spine, which paralyzed the bladder, and for several days I was obliged to relieve his bladder with a catheter.

I dressed the limb with junks and side splints, and laid it in a box.

March 14, seventeen days after the accident occurred, there was no union of the bones, no ensheathing callus, very little swelling, and no displacement. From this time he remained under the care of another surgeon until nearly the eighth week. He was then taken to the hospital, where he remained three weeks longer.

July 31, 1854, I found the limb shortened one inch, but with very little deformity. He wears an extra heel under this foot.

CASE 26. *Simple fracture. Result imperfect.*

Honore More, æt. 18, admitted to the Buffalo Hospital of the Sisters of Charity, June 18, 1853. Dr. W.'s service. Simple oblique fracture of the right leg, near the lower end of the middle third. Considerable inflammation and swelling followed. Dressed with Scultetus bandage and side splints.

Fourteen weeks after, at the beginning of my service, I found the leg shortened one inch; the upper fragment overlapping the lower and lying upon its outer, or fibular side. The foot still remained swollen, and she was able to walk only with crutches. I ordered the bandages to be removed; and directed the limb to be rubbed with a stimulating liniment.

Nov. 6, five months from the time of the accident, she was just beginning to walk without crutches. At no time, after she came under my charge, could I detect ensheathing callus.

CASE 27. *Compound fracture. Result perfect, except that a fistulous discharge has continued from the point of fracture.*

The infant daughter of Mr. Armstrong, residing on Washington Street, had her left leg broken, Sept. 9, 1852, a little below its middle. A woman had fallen upon the leg accidentally, and the broken tibia was thrust through the skin.

Dr. S. was called, and, by his request, I saw the patient with him. We found the upper fragment of the tibia projecting through the skin, and at first we were unable to reduce it. We then gave her chloroform, and with great effort finally succeeded. We dressed the limb with a gutta percha splint, and laid it upon a pillow.

Oct. 21, six weeks after the accident occurred, I found the limb firmly united and straight. Some ensheathing callus could be distinctly felt, and a fistulous discharge continued from the seat of fracture.

CASE 28. *Compound fracture. Result perfect.*

Wm. Kearney, æt. 35, fractured both bones of his leg, near its middle. Fracture compound. Dr. L., of Cattaraugus, N. Y., was employed.

Four months after, I found the bones united, without displacement, and the wound healed.

CASE 29. *Compound fracture. Result nearly perfect.*

Mrs. Margaret Conner, æt. 65, was admitted to the Buffalo Hospital of the Sisters of Charity, Dec. 19, 1856, with a compound fracture of the left leg. Fracture at the lower end of the middle third, very oblique. Direction of fracture downwards and inwards: the upper fragment being in front of the lower. The accident had resulted from a fall upon the ice, four days before her admission, and the

bone had been thrust entirely through the skin. It was dressed by Dr. G. When admitted, the limb was much swollen and vesicated.

I dressed the limb with gutta percha splints carefully moulded, and laid it upon its outside, after the method of Pott.

Jan. 1, 1857, finding that she would not lie upon her side, and that the limb was liable to displacement on account of her frequent changes of position, I laid her leg over Day's double inclined plane, and secured it snugly.

Jan. 14. Union firm, with a shortening of one-quarter of an inch. Removed the leg from the double inclined plane.

Feb. 7. The limb looks and feels perfectly straight, and one cannot discover that it is shortened, except by measurement.

CASE 30. *Compound fracture. Result imperfect. Delayed union. Slough on heel, &c.*

W. S. Mooney, æt. 35; a farmer. In the winter of 1853 and '54, both legs were caught in a threshing machine, breaking the right leg near the lower end of the upper third, and the left leg near the ankle. (See Case 112.)

Dr. E. dressed his limbs, and continued in charge to the close of the treatment. The legs were both laid over a double inclined plane. The wounds occasioned by the injury were not healed at the end of seven weeks, nor was the bone united. There was also at this time a large slough upon the back of the heel.

About the first of May, 1854, four months after the injury was received, he began to walk upon crutches.

Jan. 2, 1855, one year after the accident occurred, I examined his leg at the Buffalo Hospital.

His right leg was quite crooked, the lower part of the limb having fallen back out of line. Mooney says this was occasioned by a pillow which was laid under the fracture to prevent pressure upon the heel. The leg is shortened three-quarters of an inch.

CASE 31. *Compound fracture. Result imperfect.*

John Phaley, æt. 25. Fractured at the same time his right arm and left leg—also dislocated right shoulder. (Fractures of Humerus, Case 34.) Fracture of leg compound. I think it was broken below the middle.

Dr. R., of Dunkirk, first dressed the limb. On the third day it was dressed by Dr. P., of Buffalo.

On the twelfth day he came under my charge at the hospital.

The fragments were already quite firm. Leg shortened one quarter of an inch. The same was the condition of the limb when he left the hospital. No extending apparatus was ever employed.

CASE 32. *Compound fracture. Result imperfect.*

Thurstone Carpenter, æt. 4, received an injury, breaking both bones of the leg near its middle. Fracture compound. It was treated by Dr. C., of Buffalo.

Twenty-three years after the accident, Mr. Thurstone called upon me on account of a paralysis of his lower extremities, which had recently occurred. He stated, that from the time of the fracture until within about one year, an open ulcer had existed over the seat of fracture; and that soon after it had closed over completely he began to lose the use of his limbs. During the time it was open, small scales of bone have frequently been thrown off. The limb is half an inch shorter than the other.

CASE 33. *Compound fracture. Result imperfect. Abscess and ulcer.*

Joseph McEllicott, æt. 22. Fracture near the middle of the left leg. Compound and oblique. At the same time also he fractured his right thigh and his lower jaw. (See Fractures of Femur, Case 73.)

He was admitted into the Buffalo Charity Hospital three months after the fracture was received. The bones of the leg were then united, but with a shortening of an inch and a half; the upper fragment riding in front of the lower. The wound over the seat of fracture was not healed, and there was an abscess in the back part of the leg, which still continued to discharge pus freely. On the back of the heel there existed also a deep ulcer.

CASE 34. *Compound fracture. Death.*

Martin Foot, of Pittsfield, Mass., æt. 8, had his right leg broken in a cider-mill, Oct. 22, 1841. Fracture of tibia transverse, at a point a little below the middle of the leg, and the end of one fragment was thrust four inches through the skin, being accompanied with extensive laceration.

I reduced the fragments and closed the wounds with sutures and adhesive plasters, applying also one side splint, with Scultetus bandage. The limb was laid upon a pillow, elevated, and cold water dressings directed.

I did not see this patient again, but he was left in the charge of Dr. Henry Childs, of Pittsfield, Mass., from whom I subsequently learned that the lad survived the accident only two or three months.

CASE 35. *Comminuted fracture. Both legs broken. Result uncertain.*

Michael Carmody, æt. 19. May 9, 1849, a heavy bar of iron fell across his legs, breaking the right tibia and fibula, four inches above the ankle, and again near the middle. Both fractures of the tibia oblique. The left tibia and fibula were also broken, just above the ankle. Michael was received at the hospital on the same day, and both legs were at once dressed with dry rollers, and supported with splints and pillows.

May 16, seven days after the fractures, the swelling of the limbs being considerably reduced, the starch bandage of M. Suetin was applied to each leg.

May 18, he was allowed to sit up in bed or in a chair.

May 29, the swelling having still more subsided, the bandages were found slightly loosened. They were laid open and made smaller by cutting out a small strip, from the knee to the toes, and afterwards readjusted and secured by a dry roller.

June 13, five weeks after the fracture, the dressings were removed, and the limbs were sound and seemed perfect, except that considerable stiffness existed in the left ankle-joint. As both legs were broken, however, it is impossible to say positively that they were not shortened.

CASE 36. *Compound comminuted fracture. Result perfect.*

Luther C. Peck, Nunda, Livingstone Co., N. Y., æt. 14, was run over by a loaded sleigh, breaking his left leg through its middle third. The fracture was compound and comminuted. It was treated by Dr. Thayer, of Onondaga Hill, N. Y. No extension was employed.

After forty years, I examined the limb and could find no trace of the injury.

CASE 37. *Compound comminuted fracture. Union with shortening.*

Isaac Hoffer, of Buffalo, æt. 28, was thrown from a wagon, June 16, 1845, breaking the tibia and fibula of the left leg. The fracture was oblique, compound and comminuted, a fragment half an inch in length being removed immediately. The fracture occurred a little below the middle of the leg.

The limb was dressed by Drs. Sprague and Bronck, assisted by myself, with side splints, and then laid upon a double inclined plane.

On the seventh week the external wound had closed and the

bones were united. I then removed the splints and applied a paste bandage. This also was removed on the fifty-seventh day.

The leg is shortened half an inch.

CASE 38. *Compound fracture. Result imperfect.*

Jeremiah Caveney, æt. 33. Oct. 8, 1855, his right leg was caught between the side of a railroad car and a water tank, producing a compound fracture near the lower end of the middle third. Fracture of the tibia nearly transverse.

Dr. W., assisted by Dr. S., saw and dressed the fracture temporarily, about six hours after it occurred. A single splint was applied to the outside of the leg, which was retained in place by a roller; he was then taken to the Hospital of the Sisters of Charity, the limb was laid upon a pillow, and cool water lotions applied.

Oct. 9, I found him at the hospital. The bleeding had nearly or quite ceased. The circulation in the limb being rather imperfect, I suspended the cool water lotions, but left the dressings undisturbed.

Oct. 10. Cut open the dressings opposite the fracture, but did not disturb the splint, still fearing that the bleeding might recur. Wound in the flesh gaping, and four and a half inches in length. The tibia could be seen through the wound. I was unable to bring the edges of the wound together, I therefore laid over it a piece of lint spread with cerate.

Oct. 12. The limb had become more swollen and inflamed. He did not complain of the dressings, but on removing the splint, we found it had produced an ulceration over the malleolus externus; cool water irrigations were again ordered, the limb being carefully supported by a pillow covered with an oil cloth.

Oct. 14. Swelling and inflammation were still increasing. The limb would not bear any pressure, even such as was necessary to keep the fragments in place. I had it suspended carefully in a sacking, after the manner of Mayor, and continued the irrigations.

Oct. 19. We found it impossible to steady the limb in this position, and it was transferred to a box of bran, into which it was carefully and snugly packed. Still, however, we were unable, by any amount of pressure which he could tolerate, to prevent the lower end of the upper fragment from tilting forwards. This inclination had been noticed from the first, but never successfully resisted The swelling had now begun to subside.

Oct. 27. The wound was discharging freely; the swelling was

abated, but he could not bear any pressure, not for a moment; nor could he tolerate any efforts on our part to restore the fragments.

Nov. 13, the limb was taken from the box.

Dec. 31. It is on this day first mentioned in my hospital records, that the fragments had united firmly. I think, however, it was united some time before. The leg had shortened only about one-quarter of an inch, but the upper fragment had slid forwards upon the lower fragment nearly the whole of its diameter, making a remarkable projection in front. The lower part of the leg and foot fell slightly backwards. It was five months before he began to walk without crutches.

Aug. 24, 1856, nearly three years after the accident, I examined the limb, and found the same shortening of the limb, and the same deformity, but the limb as useful as the other. There is no ulceration, but only some unusual tenderness over the projecting bone. Over the malleolus externus is seen a scar about one inch in diameter, left by the ulceration occasioned by the splint. There is no stiffness in the ankle, and he walks firmly and without the slightest halt. He is a laborer, working day and night through a great part of each summer, in a wheat elevator, and receiving wages of $36 per month. He says he is entirely satisfied; he knows that every possible care was taken to prevent deformity, and he is thankful that his limb was saved at all.

I have related this case unusually at length, because it illustrates what great deformity may sometimes result where the utmost care and attention are employed in the treatment; and also how great may be the deformity in other cases, without any degree of maiming.

CASE 39. *Compound comminuted fracture. Result imperfect.*

John Ott, of Buffalo, æt. 48, was admitted to the hospital, Dec. 18, 1849, with a compound comminuted fracture of the left leg. He was also much bruised about his back, and his scrotum was badly lacerated. A wagon load of wood had fallen upon him.

We simply supported the limb in a box until the eighth day, when, the swelling having sufficiently subsided, we applied a paste bandage, and also made extension and counter-extension over a double inclined plane.

At the end of five weeks we removed the limb from the splint, and found the bones united, with a shortening of half an inch. During the treatment, we had used all the extension he could bear, and,

indeed, we had frequently to relax the extension. We had also the usual difficulty, where the limb is laid upon its heel, of more or less pain in this part, compelling us to make frequent changes.

Nine months after the fracture occurred, he still complained of a stiffness in his ankle and knee-joint.

CASE 40. *Compound comminuted fracture. Both legs. Result imperfect.* (See Case 105.)

John Curran, æt. 23. Both legs broken by the fall of a heavy stone upon them. Right leg broken about its middle. Comminuted. Anterior tibial artery ruptured. Left leg broken in a similar manner near the ankle.

I laid both limbs over a double inclined plane made of pillows covered with oil-cloth. To both legs I applied light side splints. The limbs were elevated, and kept moist with cool water dressings. In the afternoon of the same day, the swelling had greatly increased, and on the sixth day I placed the right leg in a box containing bran, and the left in a swing splint. No suppuration or sloughing, of consequence, occurred, although the left leg was very cold and insensible during several days, and I was obliged, after the first day or two, to let it rest upon a lower plane, and to discontinue the cold water.

At the end of two weeks I applied, for the first time, moderate extension and counter-extension. After four weeks, all extension was laid aside, the bones having united, with a shortening of about three-quarters of an inch in each leg, and with corresponding deformity.

It is quite probable that if we had made any attempts to extend either limb on the first few days, it would have resulted in the loss of both.

CASE 41. *Compound comminuted fracture. Death on the fifth day.*

John Harkner, of Buffalo, æt. 20, was struck by a falling tree, Jan. 30th, 1852, breaking his right leg, near its middle. The skin and flesh were extensively torn, and both bones were broken, and slightly comminuted. Dr. Bryant Burwell and myself, in attendance.

In order to reduce the bones, I was obliged to enlarge the opening in the skin. I tied the anterior tibial artery, which was wounded and exposed. Finding that I could not retain the fragments of the tibia in place, I bored their ends with a shoemaker's awl, and

wired them together. I dressed the limb carefully, and laid it in a well moulded gutta percha splint, supporting it with pillows, &c.

Harkner died on the fifth day from a low irritative fever, supervening upon the shock.

CASE 42. *Compound fracture, complicated with a fracture of the femur on the same side. Result imperfect.* (See Case 50 of Fractures of Femur.)

Thomas Dolanty, of Buffalo, æt. 31, was run over by a loaded cart, Aug. 14, 1854, breaking his right thigh about six inches above the knee, and his leg eight inches above the ankle. I applied a straight splint with extension, using a paste gaiter to secure the leg and foot to the foot-piece. I also applied bran junks along the leg and thigh. On the tenth day, at my request, Dr. Boardman took charge of him.

At the end of seven weeks the fragments were united, but overlapped one-quarter of an inch. The point of overlapping was very perceptible. There was no appearance of ensheathing callus. The limb was straight.

CASE 43. *Compound comminuted fracture. Amputation on thirteenth day. Death on the sixteenth day.*

John Slack, of Buffalo, about 40 years old, had his right leg broken, June 28, 1847, by being caught between the buffers of a couple of railroad cars. Dr. W., of Buffalo, in attendance.

Dr. W. requested me to see the patient with him. Probably three inches of each bone were completely comminuted, being broken into fifteen or twenty fragments. These fragments were mostly removed with forceps. Considerable venous hemorrhage existed, but the arterial circulation in the foot was unimpaired. Both the anterior and posterior tibial arteries were pulsating distinctly. The constitutional shock was not excessive.

We determined to attempt to save the limb. The limb was accordingly laid in a box well lined with cotton batting. Cold water dressings were applied to the wounds.

On the ninth day, he had a slight diarrhœa, but the red line of demarcation was established around all the sloughs.

On the thirteenth day, he was more feeble, and the wounds looked unhealthy. Dr. W. amputated the limb six inches above the knee. On the sixteenth day after the accident, and three days after the amputation, he died.

CASE 44. *Compound comminuted fracture. Result imperfect.*

Wm. Hunter, of Cayuga Co., N. Y., æt. 32, was caught in a steam engine, some time in Sept., 1848, breaking and comminuting his leg near the lower end of the middle third. Dr. P., of Sterling, N. Y., was employed.

The limb was dressed with rollers, side splints, junks, &c., and, during most of the time, supported in a box; and notwithstanding the severity of the original injury, and the violence of the inflammation which followed, the limb was finally shortened only three-quarters of an inch. It was also slightly bent at the seat of fracture.

Lower Third.

CASE 45. *Simple fracture from muscular action. Result perfect.*

Dr. T., of Buffalo, æt. 42, slipped upon the side-walk, and fell, breaking the left tibia and fibula, about three inches above the ankle. The bones broke in the effort to sustain himself, for he heard them snap before he reached the ground. Dr. T. was a very healthy, but rather heavy and muscular man. The fragments were not seen to be displaced.

Drs. Marshall and Stagg, of Buffalo, dressed the limb with a carved splint, and without extension. In four weeks he walked on crutches. He never saw or felt the smallest amount of ensheathing callus upon the tibia.

Twenty-four years after, April 1852, when I examined his leg, no traces of the fracture could be seen.

CASE 46. *Simple fracture from muscular action. Result perfect.*

Mrs. A. P. C., of Buffalo, aged about 25 years. Mrs. W. weighs nearly two hundred pounds. Jan. 10, 1852, she was descending her door steps with an infant in her arms, when, the steps being covered with ice, she slipped and fell, breaking her right leg, just above the ankle. Mrs. W. says she felt and heard the bone snap before she touched the steps. Of this she is certain.

Dr. Flint and myself in attendance.

I found the tibia broken obliquely, the fragments being quite movable, but not much, if at all, displaced. The limb was dressed with a carefully moulded and well padded gutta percha splint, and then laid in a pillow upon the bed. Mrs. W. experienced unusual pain from the fracture, for several days, for the relief of which, I

was compelled at times to permit her to inhale chloroform. She was of a nervous temperament, and had frequently resorted to chloroform before to relieve neuralgic pains. The limb became very much swollen, and remained so for a week or two. No extension was ever employed.

Within the usual time the bones united, without shortening or deformity, and in about four months, she was able to walk without any halt.

CASE 47. *Simple fracture. Result perfect.*

John C. Crooks, æt. 14, fractured his right leg, in its lower third. Fracture oblique. Dr. Jewett took charge of the case.

Eight years after, while Mr. Crooks was studying medicine, I examined the limb and found it perfect.

CASE 48. *Simple fracture. Result perfect.*

Wm. A. Ford, of Buffalo, æt. 34. Mr. Ford, who weighs about one hundred and forty pounds, jumped from the driver's seat of a coach, holding in his hands a satchel weighing about thirty pounds, striking square on the soles of his feet, upon a stone pavement. I was immediately called (Oct. 23, 1853), and found his right leg broken through its lower third; the tibia being broken nearly transversely, four inches above the ankle, and the fragments not displaced. The fibula was broken three inches above the joint, and the lower fragment inclined towards the tibia, while the upper fragment was in place. Over the lower end of the upper fragment of the fibula was a large swelling.

Assisted by Dr. Pupikofer, I applied pasteboard splints and bandages.

The fractures united readily, in the same position in which I at first found them. There was no shortening or deformity, at the end of one year after the fracture occurred.

CASE 49. *Simple fracture. Result perfect.*

R. C., of Buffalo, æt. 44, fell down three steps, Aug. 2, 1856, breaking the right leg, about four inches above the ankle. Tibia broken obliquely downwards, and to the tibial side. Simple. Mr. C. weighed at this time one hundred and ninety-six pounds.

I found the fragments of the tibia only very slightly displaced, and after having made strong extension, I dressed the limb with gutta percha splints, and laid it upon its side upon a pillow.

Oct. 3, I examined the limb, the splints having been removed for some time. He had been going about upon crutches for about three or four weeks. The limb was a good deal swollen, but appeared perfectly straight; nor could I discover any shortening.

CASE 50. *Simple fracture. Result perfect.*

Thomas Healy, æt. 14, was struck by a cart wheel, breaking both bones of his left leg, through their lower third. Fracture simple and transverse; the doctor said it was "broken square off, like a piece of candy."

Dr. Peacock, of Catheron, Ireland, dressed the limb. He used side splints, made of tin.

Twenty-one years after, I could not discover any trace of the fracture.

CASE 51. *Simple fracture. Result perfect.*

Thomas Hazard, aged about 25 years, fractured both bones of the leg, near the upper end of the lower third, Sept. 18, 1850. Simple. Fracture of tibia slightly oblique. Produced by the fall of a tree, directly across the limb.

Dr. Sprague examined the limb on the eighth day, and dressed it with a starch bandage. There was then no displacement.

Oct. 1, he was received into the Hospital of Charity, at Buffalo, and on the 3d of October, I renewed the starch dressing.

On the twenty-eighth day the bones were united; slight provisional callus. On the thirty-second day all dressings were removed. The limb was neither shortened nor deformed in any degree.

CASE 52. *Simple fracture. Result perfect.*

John Jarvis, of Port Robinson, C. W., broke the tibia and fibula, near the upper end of the lower third, in Nov., 1851. The limb was treated with simple side splints, by Dr. King, of Port Robinson.

Six months after the accident, while he was an inmate of the Buffalo Hospital, I examined the limb, and found no shortening or deformity, and only a very slight amount of provisional callus.

CASE 53. *Simple fracture. Result perfect.*

John H. Messersmith, æt. 15, fractured the tibia and fibula, through the lower third, about four inches above the ankle-joint. Fracture produced by the passage of a loaded wagon across the leg. Simple.

Drs. Pride and Van Pelt, of Erie County, in attendance.

Six weeks after the accident, I found the bones united without shortening, but surrounded with ensheathing callus. There was also a slight outward projection of the fragments.

CASE 54. *Simple oblique fracture. Result perfect.*

Angelica Lamb, æt. 7, fell, June 22, 1841, and broke both bones, near their lower ends: oblique.

Five hours after the accident, I dressed the limb with compresses, a pasteboard splint, and a roller, laying the limb upon a double inclined plane.

In four weeks union was complete, and with no displacement or deformity, except that a small ensheathing callus remained. All dressings were at this time removed, and the patient permitted to use crutches.

CASE 55. *Simple transverse fracture. Result perfect.*

July 14, 1846, I was requested, by John Trowbridge, to see with him a woman whose leg had been broken on the last day of June. She was travelling. Much swelling had supervened, and no attempt had yet been made to restore the fragments to place. We found the displacement lateral, and easily overcome. Straw junks were employed as lateral supports.

The bones united, without shortening or deformity.

CASE 56. *Simple fracture. Result perfect.*

John Keef, æt. 17, was thrown from a wagon, breaking his leg and his lower jaw at the same time. (See Case 6, Inf. Max.) The leg was broken near the upper end of the lower third. Fracture of the tibia oblique.

I dressed the leg with gutta percha splints. The bones united, without shortening and with only a very slight bend at the seat of fracture.

CASE 57. *Simple fracture. Result perfect.*

Joseph Henry, æt. 6, broke his leg, about two inches above the ankle. Fracture simple.

Dr. Charles Wilcox was employed.

Four months after, I found the limb in every respect perfect.

CASE 58. *Simple fracture. Result imperfect.*

O. C. Martin, æt. 40, was admitted to the Buffalo Hospital of the Sisters of Charity, Dec. 6, 1856. On the evening preceding he had fallen through a hole in a plank side-walk, and broken his left leg. It was dressed by Dr. N., of Buffalo, with two lateral splints, binder's board, rollers, &c.

I found the limb much swollen and vesicated, with a purple spot upon the internal malleolus produced by the pressure of the splint. Fracture in the tibia, three inches and three-quarters from the lower end of the malleolus internus; oblique; direction of obliquity from before backwards and downwards; the upper fragment in front of the lower. Limb shortened half an inch. The exact point of fracture in the fibula, we could not determine.

Dr. Lemon and Mr. Coventry made extension and counter-extension, with the limb flexed, but they were unable, even for one moment, to extend the limb to the same length with the other.

I then applied two gutta percha splints, which enveloped nearly the whole limb, and laid his leg upon its outside, after the manner of Pott.

Dec. 31. The fragments were firm, and I substituted the paste bandage for the gutta percha. On the following day he left his bed.

Jan. 10, 1857, he was dismissed from the hospital. The limb seemed perfect, except that it was shortened rather less than half an inch.

CASE 59. *Simple fracture. Result imperfect.*

Michael Dolen, æt. 26, broke his left leg by a fall, May 15, 1853. Fracture of both bones, three inches above the ankle.

Drs. P. and G. were at first employed. A splint was secured to each side of the limb, and the leg was then laid upon a pillow, upon its back.

At the end of two weeks, he was sent to the Hospital of the Sisters of Charity, and was placed in Dr. W.'s ward.

April 7, 1854, nearly one year after the accident, Dolen consulted me, at my office. The limb was shortened half an inch. The lower end of the upper fragment projected in front three-quarters of an inch, and the lower part of the leg and foot had fallen back out of line about 10°. It was also slightly inclined to the fibular side. The fibula was thrown towards the tibia at the seat of fracture. The leg was as useful as before, except that he could not run as fast.

CASE 60. *Simple fracture. Result imperfect.*

John Granger, of Hungerford, England, æt. 43, was tripped by a stone while walking, breaking his right leg, through its lower third. Fracture simple and oblique. It was treated by Richard Barker, surgeon, of Hungerford, England. He employed only side splints.

Two years after, I found the leg shortened one inch, the upper fragment riding upon the front and inner side of the lower fragment.

CASE 61. *Simple fracture. Result imperfect.*

Mrs. Hoyt, of Canaan, Conn., æt. 33, fractured her left leg through its lower third. The limb was treated by Dr. Plumb, of the same place.

Forty years after the accident occurred, Oct. 28, 1852, I found the leg shortened half an inch, and the whole limb, below the fracture, much bent inwards. The lower end of the upper fragment projecting, also on the inside of the lower fragment. The ankle has always remained quite stiff.

Mrs. Hoyt says, the reason why the bones are not in place is, that "the fracture was oblique, and the doctor could not keep it in place, although he set it three times."

CASE 62. *Simple fracture. Result imperfect.*

Dr. A. G. Bigelow, of Rochester, N. Y., æt. 22, was thrown from a sleigh, breaking both bones of his left leg, through their lower thirds. Fracture simple and oblique. Dr. A. Goldsmith, of Rochester, and now of New York, was employed.

Ten years after, I found the leg shortened half an inch, and to compensate for this, he wore an extra piece of leather under his heel. There was also a slight projection at the seat of fracture. There was no other imperfection in the limb.

CASE 63. *Simple fracture. Result imperfect.*

John Graefe, of Buffalo, æt. 30. A heavy board fell edgewise upon his right leg, Jan. 12, 1856, breaking both bones obliquely, about four inches above the joint. The fragments were displaced, and the lower end of the upper fragment of the tibia was thrown to the fibular side of the lower fragment. It was not carried forwards.

I made powerful efforts, by extension and counter-extension, to

bring the fragments into line, but I was unable to do so. I then dressed the limb with a couple of Welch's veneered splints, having carefully padded them, and laid the limb upon its fibular side, upon a pillow; the leg being flexed upon the thigh.

Jan. 19, assisted by Dr. Baker, I removed and reapplied the dressings. From this time until the cure was completed, the limb was very attentively watched, and as often as the bandages became loosened they were tightened or renewed. In five weeks, bony union was complete, and the splints were removed, except that they were to be reapplied at night, for a week or two longer. Soon after this he began to use crutches. The usual swelling of the limb occurred, and his ankle remained stiff for several months, no doubt from the effect of the fracture upon the muscles, for the ankle was never inflamed. The limb was shortened less than half an inch, and the lateral displacement was very inconsiderable.

CASE 64. *Simple fracture. Result nearly perfect.*

Peter Best, of Buffalo, æt. 31. His left leg was caught between his horse and a load of wood, breaking both bones three and a half inches above the joint. Dr. L. was called, and laid the limb on Welch's double inclined plane, applying also lateral splints.

March 1, 1856, the sixth day after the accident occurred, Dr. L. requested me to see the limb with him. It was very neatly and appropriately dressed, and the fragments, having never been much displaced, were now, also, in very nice apposition. The lower end of the upper fragment was, however, slightly overriding the lower fragment, and projecting about three lines.

This treatment was continued, and the fragments united. The bones were pretty firm on the 19th of March (24th day), and very little, if any, ensheathing callus could be felt. On the 28th, the starch bandage was applied.

April 18, he began to walk with crutches, but complained very much of his ankle, as being both painful and stiff. The stiffness continued a long time. The limb is shortened one-quarter of an inch, and the fragments remain as when I first saw it. He walks now without any halt.

CASE 65. *Simple fracture. Result imperfect.*

Wm. A. Hart, of Ct., æt. 15, broke the left tibia and fibula, about four inches above the ankle-joint. The fracture was simple, and the tibia was broken obliquely.

The limb was treated by Dr. Beecher, of Ct.

Oct. 1, 1856, forty-four years after the accident occurred, I find the lower end of the upper fragment of the tibia in front and to the inside of the lower fragment. The displacement in this direction is, however, slight. He says that his leg has shortened a little, perhaps one-quarter of an inch. I cannot now ascertain, as the other leg has been broken also, and is shortened a little.

CASE 66. *Simple fracture. Result imperfect.*

Amos A. Henly, æt. 82. Simple fracture of both bones, about three or four inches above the ankle-joint. Dr. L., of Geneseo, N. Y., was employed.

After one year, I found the limb shortened half an inch.

CASE 67. *Simple fracture. Result nearly perfect.*

James Alden, æt. 25; sailor; while wrestling, Jan. 20, 1856, he broke the left leg near the upper end of the lower third. The skin was wounded, but the wound did not communicate with the fracture.

Dr. W. dressed the fracture, and then sent him to the Marine Hospital.

Jan. 22, Dr. W., as an act of courtesy to me, and that the students of the college might avail themselves of the instruction which the case afforded, requested me to dress the limb. I could feel a very slight jutting of the fragments at the place of fracture. I applied two broad and very carefully padded lateral splints, which I secured in place with a roller. I placed the limb in Pott's position.

On the thirty-second day bony union had occurred, with a shortening of one-sixth of an inch. No deformity. No ensheathing callus.

CASE 68. *Simple fracture. Result imperfect.*

Thomas Flinn, æt. 38. Simple fracture, about three or four inches above the ankle. Dr. F., of Medina, N. Y., was employed as the surgeon.

Two years after the accident, I found the limb shortened one inch and a quarter.

CASE 69. *Simple fracture. Result imperfect.*

Thomas Shannon, æt. 40. Simple fracture near the upper end of the lower third. Dr. H., of Buffalo, was employed.

Eight weeks after the accident, May 21, 1850, Shannon called upon me. The limb was shortened half an inch, and some bent at the seat of fracture.

CASE 70. *Simple fracture. Result imperfect.*

Mrs. Maria Hatchley, æt. 54. Simple fracture, about two inches above the ankle. When I saw her she was under treatment at the New York Hospital. By the politeness of the house surgeon, I was permitted to examine the limb. The bones were united with a shortening of one-quarter of an inch.

CASE 71. *Simple fracture. Result imperfect.*

Hemon Miller, æt. 43, fractured the leg about two inches above the ankle. Dr. Beckwith and Prof. James Webster, of Rochester, in attendance.

Ten weeks after the accident, Miller called upon me. The bones were united, but the callus was not firm. The limb was shortened half an inch.

CASE 72. *Simple fracture. Result imperfect.*

Jonathan Barker, æt. 33, fractured both bones, about two or three inches above the ankle. Fracture simple. Drs. Peter and Abraham Hogaboone, of Castleton, took charge of the case.

Thirty years after, I found the limb not shortened nor deformed, but its muscles were atrophied, and the ankle still remained stiff and tender.

CASE 73. *Simple fracture. Result imperfect.*

John H. Landon, æt. 52. Dr. Josier, of York, Livingstone Co., N. Y., was employed.

Twenty-five years after the accident, I examined the limb. The leg is shortened half an inch. The fragments are united at an angle, the foot and lower part of the leg being inclined to the tibial side; ankle very stiff; enlarged; pains him very much, and more and more every year. His habits are temperate.

CASE 74. *Simple fracture. Result imperfect.*

Elijah Brewster, of Buffalo, æt. 42, fractured his right leg about three inches above the ankle-joint. Fracture simple. Dr. W. in attendance.

Eight years after, I found the leg shortened one-quarter of an inch.

CASE 75. *Simple fracture. Result imperfect.*

Elijah Brewster, æt. 50 (same patient as Case 74), broke the left leg about two inches above the ankle.

Dr. B. first dressed the limb, but on the second or third day, Dr. B. requested me to take charge of it.

The limb was united in the usual time, and at the end of three months he was dismissed with a shortening of one-quarter of an inch.

CASE 76. *Simple fracture. Result imperfect.*

Ed. M'Donald, of Buffalo, aged about 35 years, broke his leg by the fall of a tree upon it, in 1852. Fracture at the upper end of the lower third. Simple. He was taken to the Hospital of the Sisters of Charity.

Dr. W. in attendance.

Six weeks after the accident occurred, the fragments were united with a shortening of three-quarters of an inch. The upper fragment of the tibia lies in front and to the tibial side of the lower fragment.

CASE 77. *Simple fracture. Result imperfect.*

Alvin Vanderhyden, æt. 37, fractured the tibia and fibula about two or three inches from the ankle-joint. Simple.

Dr. Jakeway, of Cayuga Co., N. Y., treated the fracture.

Twenty-five years after, I found the leg shortened half an inch, and the foot, with the lower part of the leg, bent inwards very much.

CASE 78. *Simple fracture. Result imperfect.*

Justice Hubbard, of Hamburg, Erie Co., N. Y., æt. 40, had his right leg broken by the fall of a tree. Tibia broken obliquely about two inches above its lower end, and fibula about two inches higher.

The limb was dressed within ten hours after the accident, by Dr. C., of Hamburg. It was already much swollen. Two or three men made extension and counter-extension. Suitable bandages, with three lateral splints, were applied. The splints were made of shingles and binders' board. It was then laid extended upon the

bed, without any further dressing, except what might be necessary to support it in position.

After eight years, I examined the limb. He says that its perfect use was not recovered under six months, since which time he has experienced no lameness or inconvenience. The leg is shortened half an inch. The lower end of the upper fragment of the tibia is displaced inwards one-quarter of an inch. The lower end of the upper fragment of the fibula is displaced backwards. A large amount of bony callus remains upon the tibia.

CASE 79. *Simple fracture. Result imperfect.*

—— Howard, of Herkimer Co., N. Y., æt. 50, broke the tibia of the right leg at the upper end of the lower third. Fracture oblique. At the same time, also, the fibula was broken three inches above the ankle.

The limb was dressed, and subsequently treated by Dr. *D.*, surgeon in Herkimer Co.

Eighteen years after the accident, I find no perceptible shortening of the limb, but there remains a slight lateral displacement of both bones, at the seat of fracture, and also a backward displacement, by which the foot is thrown a little forwards. During several years he was a little lame, but all lameness has now disappeared.

CASE 80. *Simple fracture. Result uncertain.*

June 29, 1848, —— Humphreyville, æt. 35, broke his left leg just above the ankle. Fracture oblique.

I was called soon after the fracture occurred. Assisted by my pupil, Stephen Smith, I reduced the fragments, and having secured them in place with two lateral splints, I laid the limb over a Potter's double inclined plane.

Four months after the limb was firm, and I think without shortening or deformity; I measured the limbs, but I have no record of the fact.

CASE 81. *Simple fracture. Result imperfect.*

Asahel Turtelot, æt. 49, broke his left leg near the upper end of the lower third. Fracture simple.

Drs. L. and F., of Lowderdale, Ohio, were employed.

Two years after the fracture had occurred, Turtelot called upon me for counsel, intimating that he intended to sue his surgeons for damages.

I found the limb shortened three-quarters of an inch, and still swollen. I could not discover any error in the treatment to which these results were properly chargeable.

CASE 82. *Simple fracture. Result imperfect.*

Ed. McDonald, about 35 years old, broke the tibia and fibula near the upper end of the lower third, in 1852. On the following day he was admitted to the Hospital of the Sisters of Charity. Dr. W.'s service. The fracture was simple and oblique.

Six weeks after the fracture occurred the bones were united, with a shortening of three-quarters of an inch. The upper fragment overrides the lower; it projects also somewhat to the tibial side.

The limb has been treated with lateral splints, well padded, and without extension, except what could be accomplished through these side splints.

CASE 83. *Simple fracture. Union delayed, &c.*

Wm. C., of B., æt. 47. Mr. C. slipped and fell upon an icy sidewalk, in Jan. 1856, and his right leg coming under his body as he fell, was broken three inches above the ankle. Fracture simple. The tibia was broken obliquely, the direction of the fracture being downwards and inwards. Mr. C. weighed, at the time, about 240 lbs.

H. R., surgeon, of B., Canada, was employed. The limb was dressed with splints made of shingles and underlaid with cotton batting, and it was then placed on a pillow. During the following few days he thinks the inner splint hurt him very much. On about the sixth day the limb was laid over a double inclined plane, and now the heel became very painful, of which pain he was afterward somewhat relieved by lowering the knee.

Eleven weeks after the accident occurred, all dressings were removed.

Aug. 28, 1856, Mr. C. consulted me at my residence in Buffalo. I found the leg shortened three-quarters of an inch, the lower end of the upper fragment being in front of the lower. The lower fragment inclined backwards from the point of fracture down to the foot. The lower part of the limb remained swollen. He was unable to bear his weight upon it.

Mr. C. called my attention especially to what he supposed to be a motion between the fragments of the tibia, and which I at first also supposed did exist; but a more careful examination led me to think that it did not exist; indeed he told me himself that one side

of the tibia was firm, but the other moved, a condition of things which would not be possible. If there was any motion between the fragments it was very little, yet it is pretty certain that union was delayed four or five months.

CASE 84. *Simple fracture.*

Edward Hutchinson, æt. 27, admitted to the Hospital of the Sisters of Charity, Feb. 8, 1851. Left leg broken just above the ankle. Oblique. Fracture dressed by Dr. Sprague before admission.

I found the limb swollen, and having loosened the dressings I applied straw splints and laid the leg and thigh over a double inclined plane.

On the 24th of February he was transferred to the marine ward, under the care of Dr. W. Union took place in about six weeks. Of the precise character of the cure I am uncertain.

CASE 85. *Simple fracture. Result imperfect.*

Capt. Thompson, of Buffalo, æt. 30, fell on board his vessel, July 14, 1855, breaking his right leg about four inches above the ankle. Fracture simple and oblique.

Dr. B., of Chicago, first dressed the limb, with a splint fitted to the back of the leg. The leg was allowed to rest upon its back. On the third week he came under my care. I found the bones, Aug. 5th (twenty-first day), united, but with a slight overlapping and bend. I dismissed him at the end of about four weeks more, with the limb in the same condition, as to length, &c., as when I first saw him.

CASE 86. *Simple fracture. Result imperfect.*

Joseph Hampshire, of Livingstone Co., N. Y., aged about 33 years, fractured the right leg two inches above the ankle-joint, some time near the last of May, 1850. Fracture simple and nearly transverse. The soft parts were much bruised and the limb soon became excessively swollen.

Dr. R., of Dansville, made the first dressing, assisted by Drs. E. and B. The dressings applied were an eighteen-tailed bandage, pasteboard splints, and Hutchinson's splints. On the following day Dr. E. took charge of the patient, and continued the same dressings until the tenth day, when he substituted for Hutchinson's splints "Jarvis's adjuster." On the sixteenth or seventeenth day, the limb

showing a constant inclination to rotate outwards, it was again carefully brought into position. No union of the fragments had occurred. Drs. E. and P. were then in attendance. On the twentieth day Dr. R. resumed his charge of the patient, and continued in charge until the close of the treatment. It resulted in a union, after much delay and suffering. A deep ulcer on the back of the heel.

In April, 1852, about two years after the accident occurred, I examined the leg.

The bones were united without shortening, but with a slight deformity; the leg being bent laterally from the point of fracture. I could not see that he limped when walking, and he seemed to step firmly and freely. I was told, however, that he trod a little upon the outside of his foot.

CASE 87. *Compound fracture. Result perfect.*

Walter Smith, of Pontoosac, Mass., æt. 9, broke his right leg near the ankle, in Oct. 1841. The fracture was compound.

I reduced the fracture and applied lateral splints, laying the limb upon its outer side. Three months after a fragment of bone exfoliated of the size of a twenty-five cent piece, and the wound then closed.

One year from this date the limb was sound, straight, and without any discoverable shortening.

CASE 88. *Compound fracture. Result perfect.*

John Delaney, æt. 11. Oct. 25, 1855, his right leg was traversed by an empty railroad car, breaking both bones near the upper end of the lower third. The fracture was compound.

Dr. Lay and myself in attendance.

We found the fragments of the tibia very movable, but not much displaced. Having secured a carefully padded splint to the fibular side of the limb, we laid it upon a pillow, resting upon its outside and slightly flexed.

With unimportant modifications, this constituted the treatment to the close. Pretty extensive suppuration ensued, and a spontaneous opening occurred on the outside of the limb at an early day. Finally, however, the wounds healed, and bony union was consummated without either shortening or deformity. The bones were united in four weeks.

CASE 89. *Compound fracture. Result perfect.*

Cornelius Ecker, of Nunda, N. Y., æt. 38. The wheel of a railroad car passed over his right leg, breaking both bones at the upper end of the lower third. Compound fracture. The integuments covering the heel were torn off at the same time. He was placed under the care of a surgeon in Nunda.

Jan. 1854, one year after the accident, he became an inmate of the Buffalo Hospital, for the treatment of an ulcer upon the heel, which had remained ever since the injury was received.

I found the bones of the leg united without shortening. The lower end of the upper fragment was displaced backward about three lines. I could not detect any ensheathing callus.

CASE 90. *Compound fracture. Result perfect.*

Wm. Harrington, æt. 32, broke both bones of the leg about three or four inches above the ankle. Fracture compound. Dr. Dieffendorf, of Herkimer Co., N. Y., was employed.

Twenty-two years after, the limb was perfect.

CASE 91. *Compound fracture. Result imperfect.*

Henry Donegan, of Buffalo, aged about 30 years. Fracture of tibia and fibula near the upper end of the lower third. At the Buffalo Hospital of the Sisters of Charity.

March 5, 1853, I removed all dressings. The lower end of the upper fragment is in front and to the fibular side of the lower. The limb is shortened one inch. Bony union was at this time complete, and there was no ensheathing callus which could be felt.

CASE 92. *Compound fracture. Result imperfect.*

Wm. A. Hart, æt. 30, fractured the right leg three inches above the ankle. Tibia projected through the skin. Fracture of tibia oblique.

The fracture was treated by Dr. Walworth, of Fredonia, N. Y.

Twenty-nine years after the fracture occurred, the seat of fracture in both bones could be plainly traced, but I could not discover any displacement. He assured me, however, that it was a little shortened; perhaps one quarter of an inch.

The left leg had been broken fifteen years before, and it had always remained shorter than the right until after the right leg had been broken also, and they were now of the same length.

The ankle of this leg had occasionally been painful.

CASE 93. *Compound fracture. Result imperfect.*

Edward Rubens, of Buffalo, æt. 14, broke his left leg, July 15, 1853, by jumping from a height of eight or ten feet, and striking on his feet.

Dr. Mixer was immediately called, and dressed the limb temporarily. On the same day I was, by Dr. Mixer's request, associated with him in the charge of the case.

I found the leg broken near the upper end of the lower third. The tibia was broken obliquely; opposite the seat of fracture, but on the inner side, was a wound about one inch in length, which was gaping, and through which the end of the upper fragment could be seen, denuded of its periosteum and roughened. It was still bleeding a little.

We laid the limb over a double inclined plane, and secured the foot so as to make extension and counter-extension as much as was practicable: applying at this time no lateral splints or other dressings. The limb was then covered with cloths moistened with cool water.

July 16, we substituted irrigations for the wet cloths. After a few days, the swelling having abated, lateral splints were applied, and still later, the paste bandage was substituted for the lateral splints.

Aug. 20, we opened the paste bandage and found the fragments united, but the wound in the flesh had not entirely closed.

Sept. 2, it is recorded in my notes that the wound was closed, the projection of the upper fragment could scarcely be discovered; the limb was straight, shortened one-quarter of an inch, and there was ensheathing callus to be seen or felt.

One year later I found the shortening the same, but the limb did not appear so straight as at first, and the projection of the upper fragment in front of the lower was more distinct. The parents thought I permitted him to walk too soon, and that this had occasioned the change, but I think the change consisted in the disappearance of all of the fibrinous effusion which had concealed the deformity.

He walks without any halt or impediment.

CASE 94. *Compound fracture. Result imperfect.*

J. O'Bryan, æt. 26. Fracture compound, and at a point about three or four inches above the ankle.

O'Bryan was treated at the Bellevue Hospital, New York. One small fragment of bone exfoliated.

Five months after the fracture occurred, I found the bones united and the limb shortened three-quarters of an inch.

CASE 95. *Compound fracture. Result imperfect.*

Pat. Burke, æt. 26, broke both bones of right leg near the upper end of the lower third, Oct. 18, 1850. Fracture compound.

Dr. G., of Cattaraugus Co., N. Y., was employed. Patient was eleven weeks in bed.

March 16, 1851, five months after the accident, he was received into the Buffalo Hospital with an inflamed ulcer over the seat of fracture. Ulcer one inch in diameter. Leg shortened half an inch. Fragments united at an angle which is salient forwards. The left leg is œdematous.

CASE 96. *Compound fracture. Result imperfect.*

Michael Fellinger, æt. 24, fractured his left leg in April, 1852. Fracture compound: near the upper end of the lower third.

He was attended by a regular surgeon.

Three months after the accident, he was admitted to the Buffalo Hospital of the Sisters of Charity. The fragments were then united, with the lower end of the upper fragment projecting in front; the lower part of the leg, with the foot, falling backwards. The skin is very tender and painful over the projecting bone, and threatens ulceration. He is in good health.

CASE 97. *Compound fracture. Result imperfect.*

George W. Buffon, æt. 33, fractured both bones within three or four inches of the ankle. Fracture oblique and compound. I dressed the limb with side splints and laid it over Rose's double inclined plane, securing the foot to the footboard, and making as much extension as I could.

One year after the fracture, I found him at work, but limping badly in consequence of the swelling and tenderness which still remained about the ankle-joint. He said the leg was not shortened, but on measuring I found it shortened half an inch.

CASE 98. *Compound fracture. Result imperfect.*

A. Rogers, æt. 30, broke the right tibia and fibula, in 1846. Fracture at the upper end of the lower third. Compound. He

was taken to the New Orleans Charity Hospital, and placed under the care of Dr. Stone.

Dec. 27, 1848, Rogers was admitted to the Buffalo Hospital of the Sisters of Charity, for the treatment of an intractable ulcer, situated over the point of fracture. He says he remained in bed at the New Orleans Hospital, two months, when the bones were united, and the wound in the soft parts was healed.

Six months ago he hurt the scar, and an ulcer was rapidly formed, which has never again been closed.

On measuring the leg I found it shortened, by overlapping, half an inch. Manifest projection at seat of fracture and directly under the ulcer.

Feb. 12, 1849, he was dismissed with the ulcer nearly, but not entirely, healed.

CASE 99. *Compound fracture. Result imperfect.*

Willard Clark, æt. 14, of Evans, Erie Co., N. Y., fell under a loaded wagon, lacerating and breaking his right leg. The skin was removed from the leg quite extensively.

Dr. Aldrich, a very clever young surgeon, of Evans, had charge of the lad.

Aug. 16, 1848, two weeks after the accident, I was called by request of Dr. Aldrich. I found the limb suppurating freely, and resting upon a canvas very ingeniously suspended within a fracture-box. I saw no occasion to make any change in the plan of treatment.

Seven years from this time the leg was shortened one inch, and the lost integument was not completely repaired. It was still discharging matter.

In 1856, a friend informed me that the sore had finally healed. He walks with a slight halt.

CASE 100. *Oblique compound fracture. Result imperfect.*

Lewis Dodge, æt. 31. Right leg broken in 1831, by the fall of a piece of timber upon the top of the knee. Fracture at the upper end of the lower third, oblique and compound, the tibia projecting through the skin nearly an inch.

The fracture was reduced by Dr. Sydney H. Blossom, of Durhamville, Oneida Co., N. Y., within five hours after its occurrence. Three or four efforts were made, and it required the strength of four men, to accomplish the reduction. During the first four days,

Hutchinson's splint was employed, for the purpose of making extension and counter-extension; after which small side splints were substituted and a double inclined plane. This treatment was continued six weeks. An ulcer occurred on the heel from pressure against the splint.

I examined the limb fifteen years after the accident, and found it shortened half an inch, with a slight lateral displacement of the bone. He had himself supposed the limb not shortened. The limb was, in other respects, perfect.

CASE 101. *Compound fracture. Abscess of tibia and amputation, after twelve years.*

Col. D., of Quincy, Chautauque Co., N. Y., æt. 40, was run over by a carriage, in 1844, breaking both bones of the left leg a little above the ankle. Dr. Stockton, of Pa., was employed. The fracture was compound. The fragments united in the usual time, and with but little deformity, but the pain and swelling continued, and finally suppuration ensued. After many years of suffering, I amputated the leg near its middle, in Aug., 1856. I found the *tibia* inflamed and expanded, from the joint to about five inches above, and containing an abscess large enough to hold three ounces of pus. There were two large openings leading from it to the surface, but it contained no dead bone. He now recovered rapidly.

CASE 102. *Compound comminuted fracture. Result imperfect.*

Christian Schaeffer, of Buffalo, æt. 32, was kicked by a horse, while sitting in his buggy, May 29, 1854, breaking his right leg four inches above the ankle. He was also immediately thrown from his carriage, and the wheels passed over the thigh of the same side, bruising it severely. A wound existed opposite the fracture of the tibia, which was evidently made by the cork of the horse's shoe, and this bone was so comminuted that I was able to remove with my fingers five or six small fragments, and other partially detached fragments were permitted to remain. The wound bled freely.

I dressed the wound with lint, and supported the limb with splints and junks on all sides, and laid it in a box. Subsequently I applied a paste bandage. Complete bony union was not effected until about twelve weeks after the accident. The loose fragments which I permitted to remain were not exfoliated. At no time in the progress of the case could I detect ensheathing callus. The

wound was kept almost constantly covered and compressed by bandages and compresses, to which, in some measure, I attribute the favorable issue.

Aug. 22, 1856, nearly two years after the accident, I found the limb shortened half an inch, the upper fragment lying a little on the fibular side of the lower. His limb is as useful as before.

CASE 103. *Compound comminuted fracture. Result imperfect.*

Christian Shoemaker, æt. 50. Compound comminuted fracture, produced by the fall of a piece of timber upon it. Right leg. Three or four inches above the ankle.

Fracture of tibia very oblique, so that a sharp point projected about one-eighth of an inch. Another small wound was made by another small fragment, which was not completely detached from the soft parts.

He had had indolent ulcers on the same leg for two years.

Dr. J., of Buffalo, saw and dressed the fracture within two hours. He placed the limb in a swing splint, and applied cold water dressings. Extension and counter-extension were made from the extremities of the splint. On the seventh day pasteboard splints were applied, and the limb was again laid in the splint. The bandages were now permitted to remain undisturbed two or three weeks, the limb resting constantly on its back upon a sacking.

When united, the limb was found to be shortened half an inch. There was an ulcer on the back of the heel, and the limb was considerably bent at the seat of fracture, so that the foot and lower part of the leg fell backwards.

CASE 104. *Compound comminuted fracture. Result imperfect.*

John B. Foot, æt. 39, fractured both bones of the left leg, about two inches above the ankle-joint. Fracture compound and comminuted. Produced by being thrown from his carriage when his horses were running, his leg being caught in the wheel.

Dr. Bissel, of Genesee, N. Y., was employed. The contusion was so great that it was found impossible to use extension, or to apply anything but the most simple dressings. The limb was laid in a box, and carefully supported. Several fragments of bone were loosened and detached, including, finally, the malleolus internus. His recovery was slow and tedious.

I examined the limb six years after the accident occurred, and

found it shortened one inch, and quite crooked. It is still, at times, painful, and especially when he uses it much.

CASE 105. *Compound comminuted fracture. Both legs. Result imperfect.*

John Curran, æt. 23. Left leg broken near the ankle. (See Case 40, middle third.)

CASE 106. *Compound comminuted fracture, complicated with other severe injuries. Result imperfect. Resection of projecting bone.*

July 26, 1853, James A. Manley, æt. 30, was caught in the machinery of a steam engine, breaking his right leg at the upper end of the lower third. The wound in the skin opposite the fracture was three-quarters of an inch in length, and a small fragment of the tibia could be felt loose within. His skull was also fractured near the superior angle of the occipital bone, and a large wound in the scalp communicated with this fracture. After the injury, he remained for some time unconscious.

Drs. Strong and Hawley were called, and subsequently I was added to the council. We found his consciousness returning, and as the skull was only very little depressed at the point of fracture, we did not trephine, but dressed the wound with simple cerate.

The fragments of the tibia overlapped, and we were unable to replace them completely. The leg was also so much bruised and lacerated, that we hesitated whether we ought to make any attempt to save it. It being determined, however, that the attempt should be made, we dressed the wound and supported the limb with well-cushioned splints, with moderate bandages, and laid it upon a pillow. Cool water irrigations were then directed to be made constantly.

Aug. 5, we dressed the limb with a paste bandage, and laid it over a double inclined plane.

Aug. 25, we found the tibia projecting at the wound, and having placed him under the influence of chloroform, I removed, with a chain saw, about half an inch of the bone. We were still, however, unable to make the bone resume its place completely, although it was sufficiently shortened; yet it no longer projected beyond the skin. The consolidation of the bones and the closure of the wound now went on rapidly, and it has, finally, been cured, with a shortening of half an inch. The lower end of the upper fragment projects

considerably in front, but, at the end of a year, the limb seems as strong and as useful as ever.

I especially remarked in this case, the value of the paste bandage in diminishing the swelling. Although it was applied over suppurating wounds, and the limb was completely encased for several days, yet by its uniform and steady support, it gave great relief to the patient, and very much diminished the swelling.

CASE 107. *Compound fracture. Resulting in amputation on the fifteenth day.*

Mark Sullivan, æt. 40; at the Buffalo Charity Hospital. Fracture near the upper end of the lower third of the leg. Compound. An attempt was made to save the limb, but amputation became necessary, on the fifteenth day. The patient recovered.

CASE 108. *Compound comminuted fracture, complicated with severe contusion, &c. Amputation on the thirty-fourth day, and recovery.*

Mary, daughter of John Gibbons, æt. 5, was caught under the rollers upon which a small frame house was being moved, July 16, 1853, crushing one of her legs.

Dr. Mixer, of Buffalo, was called. On the following day, I was requested to see the case with him. The foot and leg were greatly swollen and very much discolored, and in addition to the severe injury done to the foot, the leg was broken near its lower end.

No splints were applied. For a time we entertained some hope of saving the entire limb, but eventually, the foot sloughed off, and also the skin of the leg to within four inches of the knee.

Aug. 19, 1853, assisted by Drs. Mixer and Boardman, I amputated just below the knee. Her recovery has been complete.

CASE 109. *Compound comminuted fracture. Excision of the protruding bone, on the nineteenth day. Result imperfect.*

Wm. Smith, æt. 49, on the 4th of July, 1839, fell from the stage of a building, in the town of Cortlandville, and broke his left leg, just above the ankle. The bone was thrust through a thick boot leg, and came in contact with the ground, producing a compound comminuted fracture. It was set and dressed by Dr. S. The man had been for a long time grossly intemperate. The weather, at the time, was extremely warm. On the 5th of July, he was placed under the care of Drs. H. and G., who laid the limb upon a double inclined plane, confined it with splints, and applied light dressings.

The limb was dressed daily, but violent inflammation supervened, followed by sloughing, and the lower end of the upper fragment protruded. The condition of the patient, with other concurrent circumstances, seemed to indicate the propriety of an amputation, but the patient objected, and, on the 23d of July, the case was transferred to Dr. S., who removed with the saw one inch of the protruding bone. He finally recovered, but not with a very useful limb. When I examined the limb, several years after the occurrence of the fracture, I found it shortened one inch and a quarter, and through a fistulous opening I ascertained that a sequestrum was contained within the shaft, surrounded by a large mass of callus. It was my opinion that an amputation would yet become necessary, or at least an operation for the removal of the sequestrum.

Some years later I learned, while the patient was an inmate of Auburn State Prison, that the limb still remained diseased.

MALLEOLUS INTERNUS AND FIBULA, ABOVE ANKLE-JOINT.

CASE 110. *Simple fracture. Result uncertain.*

Nicholas Fleek, Centreport, N. Y., æt. 51, called upon me, May 31, 1853, with a fracture of the malleolus internus, and also a fracture of the fibula, three inches above its lower end. The accident had occurred some days before by the fall upon it of a barrel of flour, the chime striking upon the outside of the ankle. The foot was not dislocated. The upper end of the lower fragment of the fibula was inclined against the tibia, and I could not replace it.

I dressed the limb with three straight splints, well supported with junks. I have never seen or heard from him since.

CASE 111. *Simple fracture. Result perfect.*

John Flinn, was hit violently on his leg, Oct. 5, 1854, breaking the fibula a little above the ankle, and separating the malleolus internus from the tibia.

The limb was dressed temporarily and very badly, by an empiric, but on the following day Flinn was received into the Buffalo Hospital. The leg was at that time a good deal swollen, and one of the splints was pressing very uncomfortably upon the external malleolus.

I removed all dressings, and finding the fragments were in place —and I presume they were never displaced—I laid the limb upon

a pillow, with a couple of straight board splints outside of the pillow, and supported the whole with tapes.

Oct. 7, not being able to discover any motion or crepitus, I removed the side splints entirely, and simply laid the limb on its side upon a pillow.

Oct. 12, discovered a feeble crepitus, and applied a carefully moulded gutta percha splint. Laid the limb on a pillow, resting on the back of the leg and heel.

Oct. 26, discovered an ulcer on the heel. He had hitherto made no complaint of soreness in the part. Dressed ulcer with ung. basilicon. Fragments united. No shortening or deformity.

CASE 112. *Simple fracture. Result perfect.*

W. S. Mooney, æt. 35. Both legs broken in a threshing-machine. (See Case 30.) Treated upon a double inclined plane.

Examined one year after. No defect in the joint, nor appearance of deformity.

CASE 113. *Simple fracture. Result perfect.*

Mrs. Elizabeth Swartz, of Buffalo, æt. 59, fell, in May, 1854, and broke her right leg. She fell about six feet, striking square upon the bottom of her right foot.

Dr. H. was called, and found the malleolus internus broken off, and the fibula broken three inches above its lower end. He dressed the limb with two side splints, with junks, etc.

Forty-six days after the accident occurred, I was requested to visit the patient in consultation with Dr. H.

The bones were united; the lower fragment of the tibia (malleolus internus) being slightly displaced towards the ankle-joint, and the fragments of the fibula resting against the tibia. The ankle-joint was stiff, and the heel was drawn up, throwing the toes downwards. Ensheathing callus could be distinctly felt on the broken fibula, but none on the tibia.

Feb. 11, 1855, nine months after the accident, she called at my office. She was then able to move the ankle-joint pretty freely. In other respects the limb was as in my previous examination.

CASE 114. *Simple fracture, complicated with a dislocation of the tibia inwards. Result imperfect.*

Jonathan Baker, æt. 33, of Castleton, Columbia Co., N. Y., was struck by a falling tree upon his right leg, breaking the fibula about

four inches above its lower end, and carrying away, at the same time, the malleolus internus of the tibia. The tibia was dislocated inwards.

Drs. Peter and Abraham Hogaboon, of Columbia Co., had charge of the limb.

Thirty years after the occurrence of the fracture, Aug. 21, 1852, I examined the limb. It is neither shortened, nor deformed, but it is emaciated, and not as strong as the other. It is also quite tender about the ankle, and in this respect it is worse now than it was a year or so after the accident occurred.

CASE 115. *Simple fracture, with dislocation of tibia inwards. Resulting in great deformity. Prosecution, &c.*

—— Brockway, of Cortland, N. Y., aged about 27 years. Dr. S. in attendance. The dislocation was never reduced, although repeated efforts were made to accomplish its reduction.

After one year, the patient called on me to know whether it could then be reduced. The lower end of the tibia projected inwards about one inch, and the foot was slightly turned out. The fibula was bent inwards against the tibia at the seat of fracture, four inches above its lower end. The motions of the joint were very limited. A prosecution was threatened, but after I had shown the patient a cast of one of my own cases (Case 116), in the same position, he assured me that he was fully satisfied, and would not attempt to prosecute a claim for damages.

It appears, however, from a statement made in the *Boston Medical and Surgical Journal*, vol. 31, pp. 140–2, that the case was tried in the Supreme Court of Cortland Co., N. Y., in May, 1844, and that the jury could not agree upon a verdict.

CASE 116. *Simple fracture, with dislocation of tibia inwards. Result imperfect.*

I. Borland, of Borland's Mills, Erie Co., N. Y., aged 31 years. Mr. B. fell under a rolling log, and dislocated his left tibia inwards, breaking off the internal malleolus. The fibula was also broken, about four inches from its lower end. Dr. Sweetland, an old and experienced practitioner, was soon in attendance, who, with another surgeon, failed, after repeated efforts, to reduce the dislocation.

I saw Mr. B. twenty-four hours after the accident, and immediately proceeded to attempt the reduction. The foot and ankle were somewhat swollen, but not very greatly. The skin over the

malleolus internus was discolored. The lower end of the tibia projected inwards about one inch. We first flexed the leg upon the high, and made extension with our hands during several minutes, constantly flexing and extending the foot upon the leg, and the leg upon the thigh, and in every possible way varying the position of the limb. To this mode of procedure we at length added forcible pressure upon the inside of the tibia, near its lower end. We then placed the leg and thigh over a double inclined plane, and securing the limb firmly, we attached a screw to the foot, through a sandal and gaiter, and while the leg was flexed upon the thigh, we renewed the extension. This was continued more or less during half an hour, and meanwhile pressure was made occasionally upon the inside of the tibia, and the position of the foot and leg was, from time to time, slightly varied. The power which we were thus able to apply was very great, yet it did not for one moment produce any sensible impression upon the displaced bone. We continued our efforts for more than an hour, until we were satisfied that the reduction could not be accomplished, and until the patient begged us to desist. Anæsthetics were not then in use, and I am not certain whether Mr. B. was bled or not; but I doubt whether any such means would have increased our chances of success.

Four weeks from this date, Mr. B. walked on crutches; about one year he walked with a cane, and from that time, a period of eight years, he has walked without any support. For a long time he felt a yielding in his ankle, as the weight of his body settled upon this limb, but this gradually ceased, and now he walks without any halt, and as firmly as before the accident.

The tibia still projects inwards about one inch; the foot inclines slightly outwards, and the broken ends of the fibula rest against the tibia, and are there united.

CASE 117. *Fracture, with partial displacement of tibia inwards. Result uncertain.*

—— Ried, of Buffalo, æt. 7, fell from a fence, April 30, 1854. Dr. Leech and myself in attendance. The displacement of the tibia upon its articulation had been reduced before I saw him. The malleolus internus was broken off, and the fibula was broken two inches above its lower end.

We applied a splint and suitable compresses, with bandages.

May 29th he was walking on crutches. I have neither seen him nor heard from him since.

CASE 118. *Fracture, with dislocation of tibia inwards. Result imperfect.*

John Kerner, æt. 50, fell from a scaffolding, Oct. 14, 1853, striking upon his feet, dislocating the right tibia inwards, and fracturing at the same time, the malleolus internus and the fibula. The fibula was broken about four inches above its lower end. Dr. L. was immediately in attendance, and having reduced the dislocation, he applied Dupuytren's splint. The next day, at the request of Dr. L. I took charge of the patient, assisted by Dr. Pupikofer. In a few days, vesications appeared over the malleolus internus, and we were apprehensive of sloughing. It was in part due to the splint first applied, and in part to the protrusion of the bone in this direction at the time of the accident. We took great pains afterward to avoid pressure at this point, and throughout the treatment we were extraordinarily attentive and careful.

On the sixth week we removed the dressings, and there was little or no deformity *apparent* upon either side of the limb. But, after the lapse of several months, when the swelling had entirely subsided, which at first (though slight) concealed the defects, considerable deformity was disclosed.

At the end of eighteen months, the tibia projects inwards, and the malleolus is carried a little downwards. The fibula leans against the tibia at the seat of fracture, and the foot inclines outwards. There is also less freedom of motion in the joint, than before the accident. He walks with a slight halt, but his ankle is not tender or painful.

CASE 119. *Simple fracture, with dislocation. Result perfect.*

Mrs. John Murray, of Buffalo, æt. 37, slipped and fell on an icy board, March 15, 1855. Dr. H., her family physician, being called, requested me to be sent for and to take charge of the case.

I found the malleolus internus broken off, and slightly depressed towards the ankle-joint. The fibula was broken three and a half inches above its lower end. This I was able to determine only by pressing on the lower end of the fibula, by which a slight motion was communicated to the upper end of the fracture. There was no crepitus, yet Dr. H. said that he felt crepitus distinctly, when he first arrived. The ankle was already considerably swollen. Mrs. M., who weighed 192 lbs., says that she felt a distinct snap as she fell, and before she struck the ground, and that on attempting to

stand up, her foot immediately turned out, and she felt a second snap. She was suffering great pain.

I applied no splints, but only laid the limb on pillows, and directed warm fomentations. The pains becoming more intense, I substituted, after a few hours, cool lotions for the warm fomentations. This soon gave her relief.

March 23, I applied Dupuytren's splint, securing it with a paste bandage.

April 3, I removed all dressings. Union of fragments complete. No ensheathing callus. I cannot discover that the malleolus internus is displaced. The upper fragment of the fibula is thrown towards the tibia.

After a few weeks her recovery was complete.

CASE 120. *Comminuted fracture, complicated with partial dislocation of tibia inwards. Result imperfect.*

Bernard Duffie, æt. 32. June 5, 1854, a very heavy stone fell upon his back and crushed him forwards, breaking the left innominatum (see Fractures of Innominata, Case 6) and the right leg. The malleolus internus of the tibia was broken off, and comminuted. The fibula was broken about two inches above the ankle. The tibia was also slightly displaced inwards. I dressed the limb temporarily with a pillow and side splints, and sent him to the hospital.

Oct. 1, 1854, at the commencement of my service at the hospital, I found the tibia displaced forwards and inwards upon its articulation. The fibula was united with its broken ends resting against the tibia. He had recovered considerable motion in the ankle-joint. An ulcer, which had formed on the back of the heel, was closing up kindly.

MALLEOLUS INTERNUS AND EXTERNUS.

CASE 121. *Simple fracture of malleolus internus, and of malleolus externus. Result uncertain.*

John McDonough, aged about 35, broke both malleoli of the left leg, Nov. 2, 1852.

I was called, and applied a well padded splint of gutta percha to the back of the limb, merely as a means of support in moving the limb.

The fragments united, and I need not say that there was no

shortening of the limb; but how long it was before the ankle regained its free motion, I am not able to say.

NOT BROKEN IN THE SAME DIVISIONS.

CASE 122. *Simple fracture of the tibia through the upper third, and of the fibula through its lower third. Result perfect.*

John Williams, æt. 23. Dec. 31, 1853, a load of wood fell upon his right leg, breaking the tibia through its upper third, and the fibula through its lower third. Fracture simple.

Dressed and treated by Dr. W., of Buffalo, until Jan. 11, 1854, when he came under my care at the Buffalo Hospital. Dr. W. dressed the limb on the first day, with pasteboard splints and rollers; and again renewed the dressings on the 7th of Jan. I removed the dressings on the 11th, and finding the fragments in place, I reapplied the same. About the 20th of Jan. I substituted a paste bandage.

Feb. 11, a little more than seven weeks after the accident occurred, I removed all dressings, and found the fragments united without ensheathing callus, and without shortening. Very slight projection of the tibia at the point of fracture.

CASE 123. *Compound fracture. Tibia broken obliquely at upper end of lower third; and fibula about two inches below the upper end (upper third). Result imperfect.*

Mr. ——, of ———, æt. 33, broke his right leg, April 5, 1851, by bracing his feet against the front of his carriage, when his horses were descending a hill rapidly.

Drs. W. N. and A. were present at the first dressing. There was a wound in the skin through which the tibia had been thrust. The fracture of the tibia was very oblique, and situated near the upper end of the lower third, while the fracture of the fibula was about two inches below its head.

A roller was applied to the limb, and over this pasteboard splints, then another roller, and outside of this two lateral wooden splints. The limb was laid carefully on a bed, and properly supported.

Drs. W. and A. subsequently had charge of him, and were constant in their attendance, visiting the patient almost every day, and renewing the dressings as often as was necessary or useful. After a short time a footboard was attached to a wide side splint, in order to support the foot more effectually.

The splints were continued about five weeks, when the bones were found to be united. In seven weeks he began to use crutches, but he could not bear his weight upon the limb within four months.

During the treatment, the knee was always a little flexed, the limb being supported over a double inclined plane of pillows, &c.

One year after, April 17, 1852, Mr. —— called upon me, and I found the leg shortened one inch and a quarter, the upper fragment of the tibia overriding the lower, from which it projects about half an inch. The overriding of the fibula can also be distinctly felt. This leg measures half an inch less in circumference than the other. It pains him occasionally at the seat of fracture, and the ankle remains rather stiff.

TIBIA AND FIBULA.

UPPER THIRD.

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
1	25 y.		M.		Simple; frag. of tibia never displaced.	Gutta percha splint.	U.		none		P.
2	21 y.	5 y.	M.		Simple.		U.		⅜ in.		Imp.
3			M.		Simple.		U.		½ in.		Imp.
4	35 y.	4 m.	M.	R	Simple.	Lateral splints, &c.	D. U.	119 d.	½ in.	Slight forward projection of upper fragment of tibia.	Imp.
5	39 y.	6 y.	M.	R.	Simple.		U.		1½ in.	Tibia bent back at seat of fracture; anchylosis of knee (partial).	Imp.
6	30 y.	40 d.	M.	L.	Compound.	Felt splints and double inclined plane.	U.		none	Result uncertain: (see case).	
7	25 y.	5 y.	M.	R.	Simple and comminuted.		U.			Result uncertain: (see case).	
8	34 y.	8 y.	M.		Compound.		U.		¾ in.	Tibia bent at seat of fracture.	Imp.
9	50 y.	28 m.	M.		Compound comminuted.	Side splints, box, starch bandage, &c.	U.	63 d.	¾ in.	Several fragments removed.	Imp.

MIDDLE THIRD.

10	38 y.	36 d.	M.		Simple.	Paste bandage.	U.	35 d.	none		P.
11	16 y.		M.		Simple; frag. of tibia never displaced.		U.		none		P.
12	17 y.	40 d.	M.	L.	Simple oblique of tibia.	Double inclined plane; paste bandage, &c.	U.	40 d.	none		P.
13	10 y.	15 y.	M.	L.	Simple.		U.		none		P.
14	19 y.		M.		Simple; tibia transverse.	Paste bandage.	U.		none		P.
15	15 y.	27 d.	M.	L.	Simple; tibia oblique.	Gutta percha and double inclined plane, &c.	U.	21 d.	none	Straightened on 21st day.	P.
16	20 y.	2 y.	M.		Simple.		U.	22 d	none	Ankle occasionally painful.	P.
17	31 y.	6 w.	M.	R	Simple; frag. of tibia never displaced.	Paste bandage, &c.	U.	42 d	none		P.
18	70 y.	4 w. & 5 d.	M.	L.	Simple.	Side splints, &c.	U.	33 d.		Lower fragment of tibia slightly in front of upper.	
19	63 y.	4 m.	M.		Simple.		U.		none	Ulcer over point of fracture after 4 mos.	P.
20	30 y.	5 w.	M.	L.	Simple; frag. of tibia never displaced.		U.		none		P.
21	14 y.	5 w. & 2 d.	M.	L.	Simple; tibia transverse; fragment of tibia never displaced.	Paste bandage.	U.	40 d.	none		P.
22	41 y.	3 m.	M.	L.	Simple; tibia oblique; broken by muscular action; frag. of tibia never much displaced.	Copper splints; laid in Pott's position.	U.		none		P.
23	38 y.	8 m.	M.		Simple.	Paste bandages, &c.	U.		¼ in.	Lower frag. of tibia in front of upper; unable to walk without crutches after 8 months.	Imp.

TIBIA AND FIBULA.

MIDDLE THIRD—*Continued.*

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT.				
							United or not.	When united.	Amount of shortening.	Remarks.	Perfect or Imperfect.
24	18 y.	46 d.	F.		Simple; tibia oblique.	Paste bandage, &c.	U.	48 d.	¾ in.	Upper frag. of tibia in front of lower.	Imp.
25	25 y.	11 w.	M.		Simple; tibia oblique with concussion of spine.	Side splints and a box.	U.		1 in.		Imp.
26	18 y.	5 m.	F.	R.	Simple; tibia oblique.	Side splints, &c.	U.		1 in.	Upper frag. of tibia upon outside of lower; began to walk in 5 months.	Imp.
27		6 w.	F.	L.	Compound.	Gutta percha side splints; pillow.	U.	42 d.	none	Fistulous discharge after 6 weeks.	P.
28	35 y.	4 m.	M.		Compound.		U.		none		P.
29	65 y.	47 d.	F.	L.	Compound; tibia oblique.	Pott's method 2 weeks, and then double inclined plane; gutta percha.	U.	26 d.	½ in.	No deformity	Imp.
30	35 y.		M.	R.	Compound (both legs).	Double inclined plane.	D. U.		¾ in.	Frag. of tibia bent forwards; slough on heel at end of 7 weeks.	Imp.
31	25 y.	12 d.	M.	L.	Compound (with other fractures).		U.		½ in.		Imp.
32	4 y.	23 y.	M.		Compound.		U.		⅛ in.	Paralysis of lower ext. produced by healing ulcer of 22 years, over seat of fracture.	Imp.
33	22 y.	3 m.	M.	L.	Compound; tibia oblique (with other fractures).		U.		1½ in.	Upper fragment of tibia in front; ulcer on heel, &c.	Imp.
34	8 y.		M.	R.	Compound; tibia transverse.	Side splint, pillow, cold water, &c.				Died in 3 months.	
35	19 y.	5 w.	M.	R.	Comminuted (both legs); tibia oblique.	Starch bandage, &c.	U.	35 d.		Not crooked; whether shortened or not cannot determine.	
36	14 y.	40 y.	M.	L.	Compound comminuted.		U.		none		P.
37	28 y.	57 d.	M.	L.	Compound comminuted; tibia oblique.	Double inclined plane, &c.; paste bandage after 7 weeks.	U.	56 d.	¼ in.		Imp.
38	33 y.	3 y.	M.	R.	Compound; tibia transverse.	Mayor's dressing, cool lotions, a box, &c. &c.	U.		½ in.	Upper frag. of tibia in front of lower very much; useful limb.	Imp.
39	48 y.	5 w.	M.	L.	Compound comminuted, with other complications.	Box, paste bandage, and later double inclined plane.	U.	35 d.	½ in.	Stiffness in ankle after 9 months.	Imp.
40	23 y.	4 w.	M.	R.	Compound comminuted (both legs); rupture of art.	Side splints; flexed position at first, then box, swing, &c.	U.	28 d.	¾ in.		Imp.
41	20 y.		M.	R.	Compound comminuted: rupture of art.	Gutta percha; wired fragm'ts together.				Died on 5th day.	
42	31 y.	7 w.	M.	R.	Compound, with fracture of femur of same side.	Straight splint.	U.		½ in.		Imp.
43	40 y.		M.	R.	Compound comminuted.	Box, cool water, &c.	N. U.			Gangrene; amputation on 13th day; death on 16th day.	
44	32 y.		M.		Compound comminuted.	Box, side splints, &c.	U.		¾ in.	Slightly bent at seat of fracture.	Imp.

TIBIA AND FIBULA.

LOWER THIRD.

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
45	42 y.	21 y.	M.	L.	Simple; from muscular action; never displaced.	Carved splints.	U.		none		P.
46	25 y.	4 m.	F.	R.	Simple; tibia oblique; from muscular action; not much displaced.	Gutta percha, pillow, &c.	U.		none		P.
47	14 y.	8 y.	M.	R.	Simple; tibia oblique.		U.		none		P.
48	34 y.	1 y.	M.	R.	Simple: tibia transverse; not displaced; upper end of fib. in place, but lower end inclined to tibia.	Pasteboard splints and rollers.	U.		none		P.
49	44 y.	2 m.	M.	R.	Simple; tib. obliquely down. and in.; only slightly displaced.	Gutta percha and a pillow	U.		none		P.
50	14 y.	21 y.	M.	L.	Simple; transverse.	Tin splints.	U.		none		P.
51	25 y.	32 d.	M.		Simple; tibia oblique; no displacement.	Starch bandage.	U.	28 d.	none		P.
52		6 m.	M.		Simple.	Side splints.	U.		none		P.
53	15 y.	6 w.	M.		Simple.		U.		none	Slight outward projection of tibia at seat of fracture.	P.
54	7 y.	1 m.	F.		Simple oblique.	Pasteb'd splint; double inclined plane.	U.	28 d.	none		P.
55			F.		Simple; tibia transverse.	Straw junks, &c.	U.		none		P.
56	17 y.		M.		Simple; tibia oblique.	Gutta percha splints.	U.		none	Slight bend of tibia at seat of fracture.	P.
57	6 y.	4 m.	M.		Simple.		U.		none		P.
58	40 y.	1 m.	M.	L.	Simple; tibia oblique down and back.	Gutta percha, Pott's position, &c.	U.	26 d.	½ in.	Upper fragment of tibia in front.	Imp.
59	26 y.	1 y.	M.	L.	Simple.	Splints; limb laid upon its back.	U.		½ in.	Upper frag. of tibia in front; heel fallen backwards and outwards; fibula inclined against tibia.	Imp.
60	43 y.	2 y.	M	R.	Simple; tibia oblique.	Side splints.	U.		1 in.	Upper frag. of tibia on front and inner side of lower.	Imp.
61	33 y.	40 y.	F.	L	Simple; tibia oblique.		U.		½ in.	Upper frag. of tibia on inner side of lower; foot inclined in; ankle stiff.	Imp.
62	22 y.	10 y.	M.	L.	Simple; tibia oblique.		U.		½ in.	Slight projection at seat of frac. of tibia.	Imp.
63	30 y.		M.	R.	Simple oblique.	Side splints and Pott's position.	U.	35 d.	½ in.	Upper frag. of tibia on outside of lower very slightly.	Imp.
64	31 y.	2 m.	M.	L.	Simple.	Welch's double inclined plane, starch bandage, &c.	U.	24 d.	½ in.	Upper frag. of tibia slightly in front of lower.	Imp.
65	15 y.	44 y.	M.	L.	Simple; tibia oblique.		U.		½ in.	Upper frag. of tibia in front and inside of lower.	Imp.
66	82 y.	1 y.	M.		Simple.		U.		½ in.		Imp.
67	25 y.	2 m.	M.	L.	Simple.	Lateral splints; Pott's position.	U.	32 d.	1-6 in.		

TIBIA AND FIBULA.

LOWER THIRD—*Continued.*

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
68	38 y.	2 y.	M.		Simple.		U.		1¼ in.		Imp.
69	40 y	2 m.	M.		Simple.		U.		½ in.	Slightly bent at seat of fracture of tibia.	Imp.
70	54 y.		F.		Simple.	Lateral splints; limb laid upon its back.	U.		½ in.		Imp.
71	43 y.	10 w.	M.		Simple.		D. U.		½ in.	Callus not firm in 10 weeks.	Imp.
72	33 y.	30 y	M.		Simple.		U.		none	After 30 years ankle stiff and tender, and muscles atrophied; no shortening or deformity.	Imp.
73	52 y	25 y.	M.		Simple.		U.		½ in.	Foot inclined out; ankle stiff, enlarged, painful.	Imp.
74	42 y.	8 y.	M.	R.	Simple.		U.		½ in.		Imp.
75	50 y.	3 m.	M.	L.	Simple.		U.		½ in.		Imp.
76	35 y.	6 w.	M.		Simple.		U.		¾ in.	Upper frag. of tibia on front and inner side of lower.	Imp.
77	37 y.	25 y.	M.		Simple.		U.		¼ in.	Foot and lower part of leg inclined in.	Imp
78	40 y.	8 y.	M.	R.	Simple; tibia oblique.	Side splints; straight position on back.	U.		¼ in.	Upper frag. of tibia on inside of lower; upper frag. of fibula falls back; much callus.	Imp.
79	30 y.	18 y.	M.	R.	Simple; tibia oblique.		U.		none	Lower part of leg inclined forwards and inwards.	Imp.
80	85 y.	4 m.	M.	L.	Simple; tibia oblique.	Double inclined plane.	U.			Precise result unknown.	
81	49 y.	2 y.	M.	L.	Simple.		U.		¾ in.	Limb swollen after 2 years.	Imp.
82	35 y.	6 w.	M.		Simple; tibia oblique.	Lateral splints.	U.		¾ in	Upper frag. of tibia on inside of lower.	Imp.
83	47 y.	7 m.	M.	R.	Simple; tib. obliquely down and in.	Lateral splints; double inclined plane.	D. U.	120 d.	¾ in.	Upper frag. of tibia in front of lower; lower part of limb falls back; after 7 months it is swollen and patient is unable to walk.	Imp.
84	27 y.	6 w.	M.	L.	Simple; tibia oblique.	Straw side spl'ts; double inclined plane.	U.			Precise result unknown.	
85	30 y.	7 w.	M.	R.	Simple; tibia oblique.	Carved splint; laid limb on back.	U.	21 d.	½ in.	Slight bend at seat of fracture.	Imp.
86	33 y.	2 y	M.	R.	Simple; tibia transverse.	Hutchinson's splints; Jarvis's adjuster.	U.		none	Ulcer on heel; lower part of leg inclined in.	Imp.
87	9 y.	1 y.	M.	R.	Compound and comminuted.	Lateral splints; Pott's position.	U.		none	Frag. of bone exfoliated after 3 mos.	P.
88	11 y.	1 m.	M.	R.	Compound; frag. of tibia not much displaced.	Pott's position, &c.	U.	28 d.	none		P.
89	38 y.	1 y.	M.	R.	Compound.		U.		none	Upper frag. of tibia slightly displaced backwards; ulcer on heel from extensive laceration.	P.
90	32 y.	22 y.	M.		Compound.		U.		none		P.
91	30 y.		M.		Compound.		U.		1 in.	Upper frag. of tibia on front and outside of lower	Imp.
92	30 y.	29 y.	M.	R.	Compound; tibia oblique.		U.		½ in.	Ankle occasionally painful after 29 yrs	Imp.

TIBIA AND FIBULA,

LOWER THIRD—*Continued.*

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
93	14 y.	1 y.	M.	L	Compound; tibia oblique.	Double inclined plane; paste bandage, &c.	U.	36 d.	½ in.	Upper frag. of tibia in front of lower.	Imp.
94	26 y.	5 m.	M.		Compound.		U.		⅛ in.	Small frag. of bone exfoliated.	Imp.
95	26 y.	5 m.	M.	R.	Compound.		U.		½ in.	Lower part of limb falls back; ulcer over seat of fracture after 5 months.	Imp.
96	24 y.	3 m.	M.	L.	Compound.		U.			Upper frag. of tibia in front of lower; lower part of limb falls back.	Imp.
97	33 y.	1 y.	M.		Compound; tibia oblique.	Double inclined plane, with extension.	U.		½ in.	Ankle swollen and painful after 1 year.	Imp.
98	30 y.	3 y.	M.	R.	Compound.		U.		½ in.	Some projection of tibia at seat of fracture; ulcer at same point after 3 years.	Imp.
99	14 y.	7 y.	M.	R.	Compound.	Suspension in a box.	U.		1 in.	Ulcer healed after 6 years.	Imp.
100	31 y.	15 y.	M.	R.	Compound; tibia oblique.	Hutchinson's splints, &c. &c.	U.		½ in.	Ulcer on heel; slight lateral displacement of tibia.	Imp.
101	40 y.	12 y.	M.	L.	Compound.		U.		none	An abscess formed in the tibia, and amputated after 12 yrs.	Imp.
102	32 y.	2 y.	M.	R.	Compound comminuted.	Box; paste bandage, &c.	D. U.	84 d.	½ in.	Upper frag. of tibia on outside of lower.	Imp.
103	50 y.		M.	R.	Compound comminuted; tibia oblique.	Swing splint, extension, &c.	U.		½ in.	Ulcer on heel; lower part of limb falls back.	
104	39 y.	6 y.	M.	L.	Compound comminuted.	Box, &c.	U.		1 in.	Crooked; after 6 yrs. it is occasionally painful; several fragm'ts exfoliated.	Imp.
105	23 y.	4 w.	M.	L.	Compound comminuted (both legs); rupture of art.	Side splints, &c. (see Case 40).	U.	28 d.	⅝ in.		Imp.
106	30 y.	1 y.	M.	R.	Compound comminuted and complicated.	Paste bandage, double inclined plane, &c.; resection of projecting bone on 30th day.	U.		½ in.	Upper frag. of tibia in front of lower.	Imp
107	40 y.		M.		Compound.		N.U.			Amputation on 15th day.	Imp.
108	5 y.		F.		Comp. comminuted, &c.		N.U.			Amputation on 34th day.	Imp.
109	49 y.		M.	L.	Compound comminuted.	Double inclined plane; resection of bone on the 19th day.	U.		1½ in.	Abscess of bone after several years.	Imp.

LOWER THIRD (MALLEOLUS INTERNUS, AND FIBULA ABOVE ANKLE-JOINT).

110	51 y.		M.		Simple; fibula broken 3 in. above lower end.	Side splints, &c.	U.		none	Lower frag. of fibula inclined against tibia.	
111			M.		Simple; fibula broken a little above ankle.	Various.	U.		none		P.
112	35 y.	1 y.	M.	L.	Simple (both legs broken).	Double inclined plane, &c.	U.		none		P.

TIBIA AND FIBULA.

LOWER THIRD (MALLEOLUS INTERNUS, AND FIBULA ABOVE ANKLE-JOINT)—*Continued.*

No.	Age when it occurred.	Time since it occurred.	Sex.	Right or left side.	Character of the fracture.	TREATMENT.	RESULT. United or not.	When united.	Amount of shortening.	Remarks.	Perfect or imperfect.
113	59 y.	9 m.	F.	R.	Simple; fibula broken 3 in. above lower end.	Side splints, &c.	U.		none	Mal. int. displaced down; broken fibula resting against tibia, &c.; ankle some stiff.	Imp.
114	33 y	30 y.	M.	R.	Simple; fibula broken 4 in. above lower end.		U.		none	Limb atrophied after 30 years, and tender about the ankle; neither shortened or deformed.	Imp.
115	27 y.	1 y.	M.		Simple; fibula 4 inches above lower end.		U.		none	After 1 year, motions of joint limited; tibia unreduced; fragments of fibula fall against tibia; prosecution.	Imp.
116	31 y.	8 y.	M.	L.	Simple; fibula 4 inches above lower end.	Dupuytren's splint, &c.	U.		none	Tibia unreduced; fragments of fibula fall against tibia, &c	Imp.
117	7 y.		M.		Simple; fibula 2 inches above lower end.	Splints, &c.	U.		none		
118	50 y	18 m.	M.	R.	Simple; fibula 4 inches above lower end.	Splints, &c.	U.		none	Foot inclines out; tibia projects on inner side; fragments of fibula rest against tibia.	Imp.
119	37 y.		F.		Simple; fibula 3½ inches ab. lower end.	Dupuytren's splint, &c.	U.	19 d.	none	Upper fragment of fibula falls towards tibia.	P.
120	32 y.	4 m.	M.	R.	Comminuted of tibia; fibula broken 2 in. above ankle.		U.		none	Tibia displaced forwards and inwards; frag. of fibula falls against tibia; ulcer on heel.	Imp.
					LOWER THIRD (MALLEOLUS INTERNUS AND EXTERNUS).						
121	35 y.		M.	L.	Simple.		U.		none		
					NOT BROKEN IN THE SAME DIVISIONS.						
122	23 y.	7 w.	M.	R.	Simple; tibia in up. ⅓; fibula in lower ⅓.	Splints, paste bandage, &c.	U.		none		P.
123	33 y.	1 y.	M.	R.	Compound; tibia lower ⅓; fibula upper ⅓.	Side splints, double inclined plane, &c.	U.		1½ in.	Ankle stiff, &c.	Imp.

ANALYSIS OF ALL THE CASES OF FRACTURE OF THE TIBIA AND FIBULA.

Of 123 fractures of the leg (tibia and fibula) 9 belonged to the upper third, 35 to the middle third, and 77 to the lower third. In

2 cases the two bones were not broken through the same divisions.[1]

111 were males, and 12 females. 18 were under 16 years of age; 37 over 15 and under 31; 45 over 30 and under 46; 13 over 45 and under 60, and 5 over 60. The extreme limits of age were 4 years and 85; the average of all their ages being nearly 32 years. 76 were simple, and 47 compound, or more or less complicated; the proportion of compound fractures being larger than in the case of any other long bone.[2] 42 are known to have occurred in the right leg and 37 in the left.

The average period of union in 29 cases, including those in which union was delayed beyond the usual time, was 40 days and a fraction over.

Union was delayed in 5 cases, 3 of which were cases of simple fracture and 2 of compound. In one instance the fracture was in the upper third; in one instance in the middle third, and three times in the lower third. The longest period was 17 weeks. In no case, except where amputation or death interposed, did the bones refuse finally to unite.

Of 108 fractures, 37 are marked perfect, and 71 imperfect. 49 are known not to be shortened, and 61 are known to be shortened. The greatest amount of shortening recorded in any case is one inch and a half; and the average shortening of the 61 known to be shortened is $\frac{1}{2}$ an inch and $\frac{25}{44}$ of an inch. The average shortening of 32 simple fractures known to have been shortened is $\frac{1}{2}$ an inch and $\frac{21}{32}$ of an inch. And the average of all the simple fractures, including those not shortened at all, as well as those which are shortened, is $\frac{1}{3}$ of an inch and $\frac{1}{10}$ of an inch, lacking just $\frac{1}{30}$ of $\frac{1}{4}$.

The upper fragment of the tibia has been found more or less in front of the lower, sometimes only very slightly, in 11 cases. In 4 of these cases a double-inclined plane was used; in 3, the limb was dressed either with paste bandages or side splints and laid

[1] It is very probable, indeed quite certain, that some of the cases recorded as belonging to one division or another, were cases in which the two bones were broken in separate divisions, since it has been found often impossible to determine at what point the fibula was broken. I have been compelled to decide this question upon presumptive rather than positive evidences.

[2] Of 80 cases reported by W. W. Morland, M. D., from the Massachusetts General Hospital, and in which the character of the accident is recorded, 39 were compound, and 41 simple. See article on Fractures in the *Transactions of the Mass. Med. Soc.* for 1840, by A. L. Peirson, M. D.

traight upon its back; in 1, Mayor's plan was adopted, and in 1, Potts'.

The upper fragment of the tibia was in front and upon the outside of the lower in 2 cases; in front and upon the inside in 3 cases; upon the outside in 2 cases; upon the inside in 3 cases, and behind the lower fragment in 3 cases.

The limb was more or less inclined backwards, from the seat of fracture downwards, in 5 cases; in two of which the limbs are known to have been treated upon a double inclined plane, and in one the limb was suspended in a box. In all of the cases it is believed that the limbs rested upon their backs during the treatment.

The lower part of the limb was inclined inwards in 5 cases, in four of which cases the treatment is not recorded; in the fifth, both Hutchinson's splint and Jarvis's adjuster were used at different periods of the treatment, with extension; the limb was constantly upon its back.

In Case 73, the lower part of the limb was inclined out; in Case 5, forwards, and in Case 79, forwards and inwards. In not one of these cases is the treatment recorded.

In six other cases there has remained a slight bend at the seat of fracture in the tibia, but its direction is not mentioned. In four of the six, the limbs were laid upon their backs, and in two of the four cases they were in a box.

In all of the seven cases recorded as having been treated by Potts' method, the line of the axis of the limb is preserved.

In five cases, all of which except one, were compound fractures, ulcers were produced upon the heel by the apparatus. In all of these cases the limbs rested upon their backs; over a double inclined in two cases, and upon a single plane in the remainder. In three cases, presenting each of them lateral obliquities of the lower portion of the limb as well as ulcers on the heel, extension and counter-extension were employed, once by Hutchinson's splint alone; once by Jarvis's adjuster and then Hutchinson's splint, and once in a Mayor's apparatus.

I have never seen an ulcer on the heel where Potts' position was adopted.

The ankle-joint has been found painful, occasionally, after one, two, and twenty-nine years; more or less anchylosed after one year, thirty and forty years; both stiff and painful in one case after twenty-five years. Four of these seven cases were compound fractures. None of them belonged to the upper third; one was through the

middle third, and six through the lower third; three of these latter being within three inches of the ankle-joint. In Case 97, extension with counter-extension constituted a part of the treatment.

In Case 5, a simple fracture, belonging to the upper third, partial anchylosis of the ankle existed after six years; and in Case 39, a compound fracture of the middle third, the knee and ankle were both somewhat stiff after nine months. Extension with counter-extension constituted a part of the treatment in this latter case.

In Case 19, a simple fracture of the middle third, united without shortening or deformity, an ulcer has existed over the seat of fracture two years, the cause of which I have not ascertained. In Case 32, of compound fracture, the bones having been broken in infancy, an ulcer existed over the point thirty-two years; scales of bone were frequently exfoliated. In Cases 95 and 98 of compound fractures an ulcer existed over the fracture in one case five months, and in the other three years; in both cases the bones (tibias) had united at an angle which was salient forwards under the ulcers.

In Cases 23 and 26, both simple fractures of the middle third, the patients did not walk without crutches until after eight months in the one case, and five months in the other.

In reference to the causes producing these fractures, I have noticed in an analysis of 66 cases, that in the upper third one has been referred to a direct cause and one to an indirect; in the middle third, 27 have been referred to a direct cause and none to an indirect; in the lower third, 29 to a direct cause and 8 to an indirect. An observation which does not exactly sustain the remark of Malgaigne, based upon his analysis of 67 cases, that fractures of the upper third are produced by direct causes alone, those of the middle third much more frequently by indirect causes, and that those of the lower third are especially due to indirect causes. Direct causes, such as fall upon the side of the limb, blows, &c., produce a large majority of the fractures of the lower third, only the proportion is smaller than in the middle third.

I notice also that of the 51 cases of fractures of the leg produced by direct blows, 25 were compound and 26 simple, while of the 4 mentioned as the result of falls upon the feet 2 are compound and 2 are simple. It would appear, therefore, that both causes operate nearly equally in the production of simple or compound fractures.

Three fractures have been produced by muscular action alone; two of which belonged to the lower third and one to the middle. They all occurred in adults; in neither case were the fragments

much, if at all, displaced, and all recovered without any shortening or deformity.

Of the 11 fractures of the malleolus internus and of the fibula above the ankle-joint, 6 were the result of falls upon the bottom of the foot, and 5 of direct blows upon the outside of the ankle.

Analysis of the Fractures of the tibia and fibula belonging to the upper third.

All of the 9 fractures belonging to the upper third, occurred in males; of whom the youngest was 21 years, and the oldest 50 years. The average being 31; 5 were simple, and 4 more or less complicated. The treatment was so various as not to deserve especial mention. In one case, union was delayed one hundred and nineteen days. The average shortening of the whole 9 cases is half an inch and $\frac{15}{48}$ of an inch.

Analysis of the Fractures of the tibia and fibula belonging to the middle third.

Of the 35 fractures of the middle third 16 were simple, 18 compound, and 1 comminuted. Several of the compound fractures were also comminuted and otherwise complicated. 31 were males, and 3 females. 10 are known to have occurred in the right leg, and 14 in the left. The ages ranged from 4 years to 70, and averaged 17.

In 4 cases the tibia was found to be broken nearly transversely, and in 10 obliquely. The direction of the fracture not being mentioned in the remainder. In 5 cases the fragments were never at all, or very slightly, displaced.

The average shortening of all the fractures of the middle third is half an inch and $\frac{3}{128}$ of an inch.

In one case union was delayed 7 weeks or more.

Analysis of the Fractures of the tibia and fibula belonging to the lower third, excepting only fractures of the malleoli.

Of the 77 fractures of the lower third, 11 were fractures of the malleolus internus, and of the fibula above the joint, and 1 was a fracture of both malleoli. Rejecting these, 65 remain; of which 42 were simple, and 23 compound, with also, occasionally, other complications. 59 were males, and 6 females. 23 are known to

have occurred in the right leg, and 18 in the left. The ages ranged from 6 years to 85. In 2 cases the fractures were produced by muscular action alone. In 4 the tibia is known to have been broken transversely, and in 28 cases obliquely, in 1 of which the obliquity is recorded as downwards and backwards, and in 2 cases downwards and inwards. In the remaining cases the direction of the obliquity is not mentioned.

The average shortening of these cases is one-fifth of an inch, and a small fraction over.

Analysis of Fractures of the malleolus internus, with fractures of the fibula above the ankle-joint.

Of the 11 fractures of the malleolus internus, and of the fibula, above the joint, 9 were males and 2 females. 4 are known to have occurred in the right leg, and two in the left. Their ages ranged from 7 years to 59. Not 1 was compound, 1 was comminuted, and the remainder were simple. In 2 cases the fibula was broken two inches above its lower end; in 2 cases it was broken three inches above; in 1 three and a half inches, and in 3 cases four inches.

Of course, no shortening occurred in either case. In 7 of the cases, the fibula remained displaced inwards towards the tibia, in all of which, save one, some degree of stiffness existed in the ankle-joint. In 4 cases the foot inclined outwards more or less, and the lower end of the tibia projected inwards.

In 2 cases only were the limbs found to be perfect.

TREATMENT.

The leg is subject to a greater variety, and to more frequent complications in its fractures, than any other portion of the body. Without attempting to indicate the special rules which ought to govern us in the treatment of these various accidents, I shall only allude to a few points, which seem to demand especial attention.

It is to these accidents, especially, that the remarks of Dr. Norris, already quoted, are applicable. The large size, and irregular form, of the bones of the leg, the small amount of muscular tissue covering them, especially near the articulations, the severity of the injuries to which they are liable, with their remoteness from the centre of circulation—these circumstances altogether, render them exceed-

ingly exposed to injury from the too great or unequal pressure of splints or of bandages; and it has often occurred to myself, as it has to Dr. Norris, to find the skin vesicated, or even ulcerated and sloughing, when the patients are first admitted to the hospital; a condition which, in nine cases out of ten, is due to the mal-adjustment of the splints, or to the tightness of the bandages. Too much care can never be exercised in the application of the first dressings, nor ought they ever to be permitted to remain longer than twenty-four hours, without being removed, or freely opened, so as to permit an examination of the limb thoroughly on all sides.

As to the position of the limb, it is quite certain that no rule of universal application can be made; a remark, indeed, which might hold true, in some degree, of all fractures, but which is especially true of fractures of the leg; nevertheless, a careful observation of the cases treated under my own eye, has gradually forced upon me a conviction that, in a large majority of cases, Potts' position was greatly to be preferred, viz., flexing the leg upon the thigh, and placing the whole limb upon its outer side. It is only occasionally that, in fractures of the leg, extension and counter-extension can be safely employed; an assertion which, however much it may excite surprise, experience will prove true. In such cases as demand or warrant a resort to extension and counter-extension, a double inclined plane furnishes the most convenient mode for its accomplishment. In nearly all other cases, I prefer Potts' position, which, while it prevents, in some degree, the shortening of the limb, is quite as effectual as any other mode, in preventing the forward displacement of the upper fragment, and less likely to permit a backward or forward displacement of the lower part of the limb, or to give rise to ulcerations; and it is almost always—the limb being supported upon its broadest surface—much more easy and comfortable to the patient. If this position is adopted, the limb ought to be placed upon a broad, well-cushioned splint, extending from a little above the knee, to the end of the foot; but, carefully padded lateral splints, with rollers, &c., are indispensable, as additional means of support to the broken limb.

Boxes are rarely useful, except in certain compound fractures. They are heavy and awkward machines, which prevent the patient from moving readily in bed; or which being fixed, if he does move, allow the upper fragment only to descend, or to move upon the lower, as a fixed point. If used at all, they ought generally to be

suspended, or made to move, on a suspended railway.[1] But, however they are arranged, the limb is a great part of the time concealed from sight, and the surgeon is prevented from making use of such means to rectify deviations in the line of the bone, as he would probably have otherwise employed.

For Hutchinson's splint[2] and Jarvis' adjuster, as a means of treating fractures of the leg, I have nothing but unqualified disapprobation. They have, either singly or together, cost the patient more suffering, and occasioned more maiming, than any other apparatus I have ever seen employed; and more than once the surgeons themselves have had to pay the sufferers for their losses.

In fractures of the leg, the *apparatus immobile* of M. Suetin, either in its original form, or in some of its various modifications, has demonstrated most favorably its capacities, and achieved its greatest triumphs; while, at the same time, it is in the treatment of these fractures, also, that it has proved occasionally most pernicious, and received its severest discouragements.

English and American surgeons now seldom employ it, except after the subsidence of the swelling, and not then, unless the circumstances are peculiarly favorable for its application.

For a very able and elaborate, but somewhat partial exposition of the principles which should govern its application, and of the mode of application, I will refer you to a work entitled *Advantages of the Starched Apparatus in the Treatment of Fractures and Diseases of the Joints*, by Joseph Samson Gamgee, London, 1853, and also to a work entitled *Surgical Research*, by the same author. London, 1856.

[1] In compound fractures, the method of using the box, by filling it with coarse bran, first suggested by Barton, of Philadelphia, is to be preferred. See Amer. Journ. of Med. Sci., vol. xvi. p. 31, and vol. xxix. p. 515.

[2] Amer. Journ. of Med. Sci., vol. xx. p. 37. Coates on Fractures.

APPENDIX:

CONTAINING

SOME OF THE

AMERICAN INVENTIONS AND IMPROVEMENTS OF APPARATUS.

PLATE I.

FIG. 1.—PHILIP SYNG PHYSICK'S THIGH-SPLINT.

This splint is a modification of Desault's, and is constructed as follows: A long firm board, extending from the axilla to some inches beyond the foot, and furnished with holes at each extremity for the passage of the extending and counter-extending bands; Dr. Hutchinson has added also, at the suggestion of Dr. Physick, a transverse foot-piece. Another long inside splint, junks, splint-cloths, a padded perineal band, and adhesive plaster extending bands, with rollers, complete the dressings.

A majority of American surgeons employ this splint.

FIG. 2.—WM. GIBSON'S THIGH-SPLINT.

A modification of Hagedorn's splint, in which two long splints are used instead of one as recommended by Hagedorn; and both are extended well into the axilla. No perineal band is employed (counter-extension being effected by keeping the axis of the pelvis in a line with the axis of the body, and by pressure in the axilla), nor side-splints, nor bandages, except such as are necessary to secure the splint to the body.—*Institutes and Practice of Surgery*, by Wm. Gibson, 6th ed., vol. i. pp. 312–13. 1841.

FIG. 3.—WM. GIBSON'S SINGLE INCLINED PLANE.

Occasionally recommended by Dr. Gibson in fractures of the thigh. Both thighs are placed upon the inclined plane, and secured to the foot-board by gaiters (seldom used).—*Gib. Surg., op. cit.*, vol. i. pp. 321–4.

FIG. 4.—WM. E. HORNER'S THIGH-SPLINT.

a. Long outside splint, extending into axilla, and padded, so as to avoid the necessity of junks; with fenestra, for extending and counter-extending bands; and also a foot-piece.

b. Short inside splint, made to extend from the perineum to the bottom of the foot; across the excavated upper end of this splint, a strip of leather is stretched to receive the pressure of the perineum, while the perineal band is made to pass through two firm leather loops on the outside of the splint.—*Treatise on the Practice of Surgery*, by Henry H. Smith, pp. 415–16. 1856.

FIG. 5.—JOSEPH HARTSHORNE'S THIGH-SPLINT.

Counter-extension is here also effected by the pressure of the cushioned head of the inside splint against the perineum. The head of the outside splint is padded in the same manner, but not with a view of using it for counter-extension. "In compound fractures, this outside splint may be removed, and the wound dressed without affecting the extension of the limb."—*Smith's Surg., op. cit.*, vol. i. pp. 417–18.

Fig. 1.

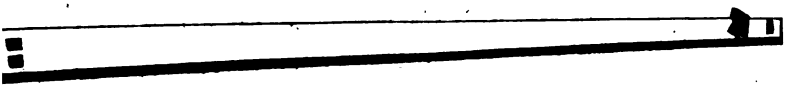
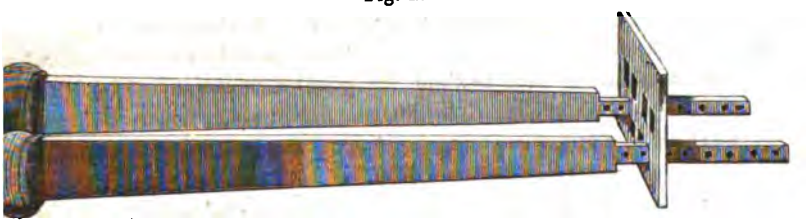


Fig. 2.



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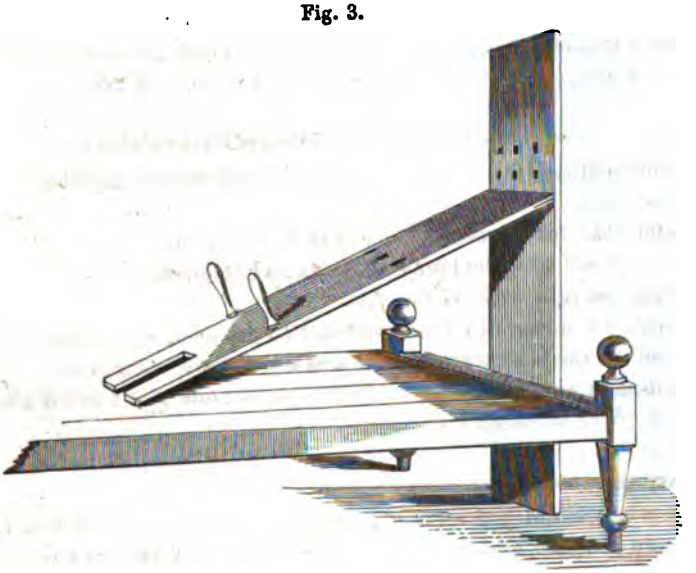

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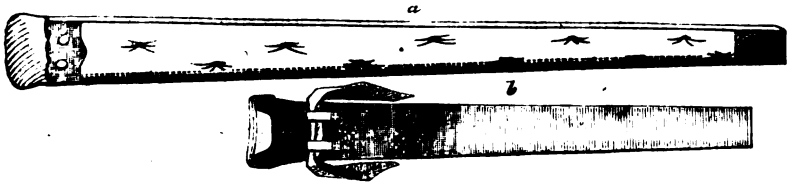

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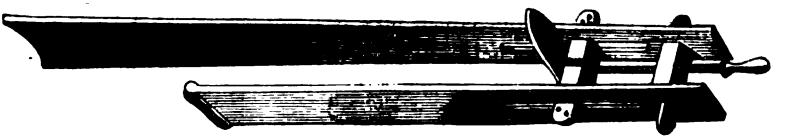


PLATE II.

H. Hartshorne's Thigh-Apparatus.

Fig. 1. Apparatus, of outer and inner splints, counter-extending block, foot-board and windlass, and thigh-bandage. Extension to be made by adhesive plaster, fastened to the roller or windlass.

Fig. 2. Same, showing the shape of the block, adapted to the region of the tuberosity of the ischium, for counter-extension. The buttock should also be protected by layers of adhesive plaster, to prevent attrition. Extension is regulated by a pin inserted into the side of the outer splint.

Figs. 3 and 4. Counter-extending block. A flat junk-bag is to be placed under the whole limb, up to the edge of the block; and one upon each side of the limb, as in Desault's.—*Quart. Summary of Trans. of College of Phys. of Philada.*, vol. ii., No. 9, 1855.

Fig. 5.—Charles Ap. Bowen's Thigh-Splint.

a. Splint composed of two thin pieces of board screwed together.
b. Brass band.
c. Sliding bar, for increasing the length of the splint.
d. Crutch-head, with slots for counter-extending bands.
e. Transverse grooves in sliding bar.
f. Eccentric roller, which being turned by its handle, *g*, is made to fasten itself in the transverse grooves and secure the sliding bar.
h. Foot-piece with slots for extending bands on one side, and for counter-extending bands on the other.
i. Screw.
j. Martingale counter-extension straps.
k. Pin which holds the screw in place. By taking out the pin, *k*, the screw and the foot-piece can be removed, and then the whole apparatus may be packed in a very small space.

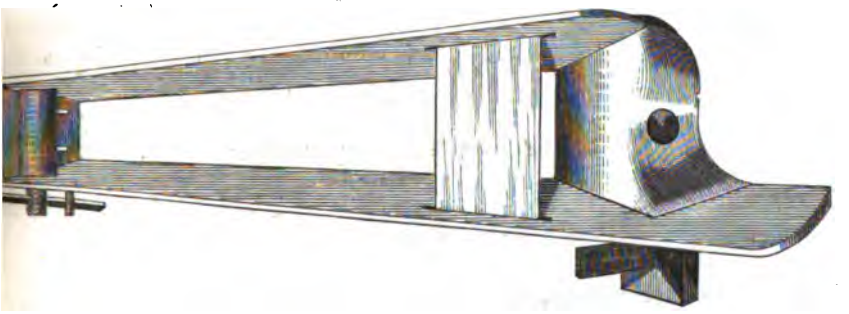
Fig. 6.—E. K. Sanborn's Thigh-Splint.

a. Sliding crutch, which may be carried as high as the axilla.
b. Thumb-screw, to fasten crutch.
c. Joint in splint, by which it may be separated and conveniently packed.
d. Head of screw. The screw has a range of twelve inches.
e. Cross-bar adjusted by screw.

Extension is effected by means of adhesive straps, and counter-extension by a perineal band; but the patient may at any moment relieve the pressure in the perineum by resting his axilla upon the head of the crutch.—*Sargent's Minor Surg.*, p. 182.

Fig. 1.

Fig. 2.



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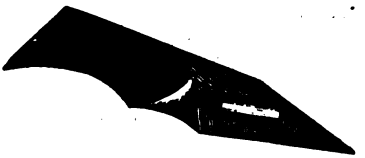

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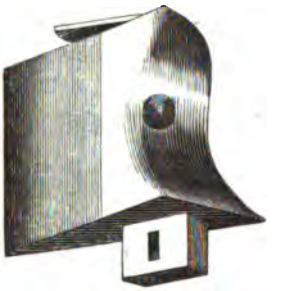

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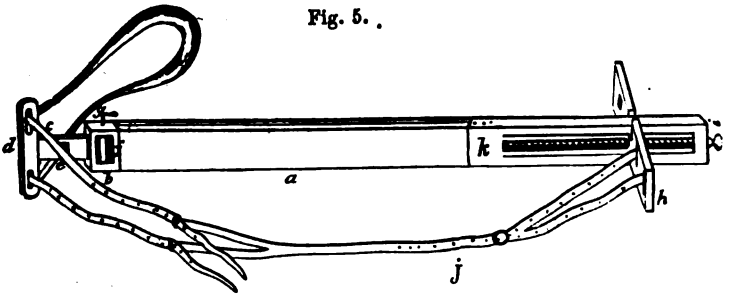

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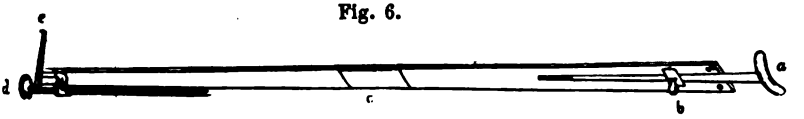


PLATE III.

J. F. Flagg's Thigh Apparatus.

Fig. 1. Pelvic belt, and perineal straps.

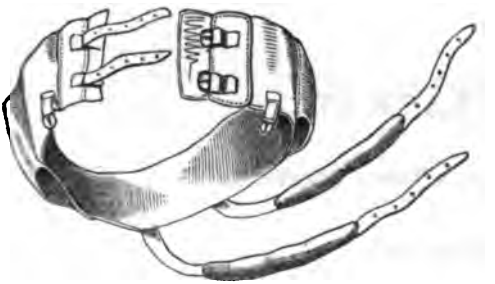
Fig. 2. Foot-piece and screw.

Fig. 3. Lateral view of the apparatus, without the belt.

Fig. 4. Front view, with folded sheet laid across.

Fig. 5. Apparatus applied.

Fig. 1.



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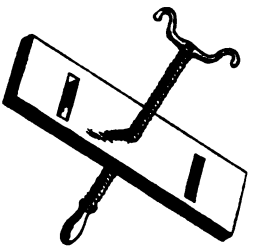


Fig. 3.

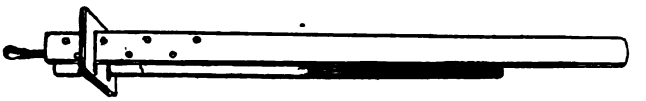


Fig. 4.

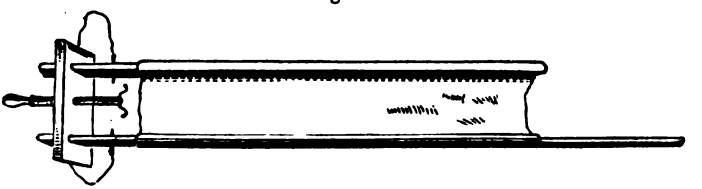


Fig. 5.

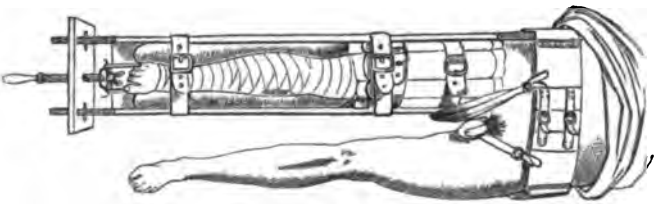


PLATE IV.

J. F. Flagg's Thigh Apparatus.

Fig. 6. Side view of apparatus applied.

Figs. 7, 8. Mode of making extension with adhesive plasters.

Fig. 9. Perineal band secured with a padlock.

"The belt is made of strong webbing, having pockets on each side, to receive the long splint. It is also furnished with straps and buckles. The perineal strap, corresponding to the injured side, is kept constantly buckled, while the other may be occasionally loosened, or left off, as its purpose is only to steady the apparatus. Where the straps pass under the perineum, they are covered with wash-leather. Before applying the belt, a pillow-case or two may be passed around the waist. The padlock is only to be used in case the patient persists in unbuckling the straps. The splints being applied, with also short side splints, junks, containing bran or sand, &c., are to be secured more firmly to the limb by bands of webbing and buckles. In using the adhesive strap extension, care should be taken to protect the ankles underneath the straps."—*L. M. S., Jr.* See *New Eng. Journ. of Med. and Surg.*, vol. x. p. 38; also *Boston Med. and Surg. Journ.*, vol. xxv. p. 223.

Fig. 6.

Fig. 7.

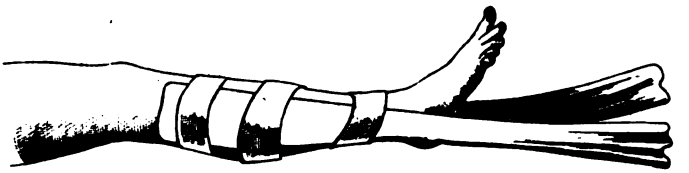


Fig. 8.

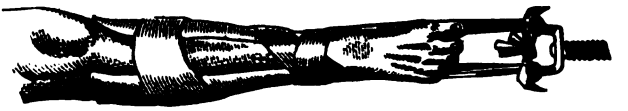


Fig. 9.

PLATE V.

JOHN NEILL'S STRAIGHT THIGH-SPLINT.

FIG. 1.—Extension and counter-extension, made at the same moment.—See *Phil. Med. Exam.*, vol. ii. p. 582.

FIG. 2.—THE AUTHOR'S SINGLE STRAIGHT THIGH-SPLINT, FOR CHILDREN. See *Report*, p. 330.

FIG. 3.—THE AUTHOR'S DOUBLE STRAIGHT THIGH-SPLINT, FOR CHILDREN OR ADULTS.—See *Report*, p. 330.

FIG. 4.—THE AUTHOR'S SINGLE STRAIGHT THIGH-SPLINT, FOR CHILDREN OR ADULTS.

a. Crutch-head, with two rings for the passage of the perineal band.

b, *b*. Upper sliding portion of the splint.

c. Ratchet to secure the upper portion of the splint when drawn out.

d, *d*. Lower sliding portion of the splint, to which is attached the foot-block.

e. Foot-block, which, with the lower sliding portion of the splint, *d*, is moved upwards or downwards by the screw, *f*.

g. Brass ring fastened to the outer end of the foot-block. The perineal band having passed through the rings in the crutch-head, is made fast to this ring; so that when the foot-block descends, extension and counter-extension are made at the same moment.

h. Cross-piece, to steady the long splint.—See *Report*, p. 330.

Fig. 1.

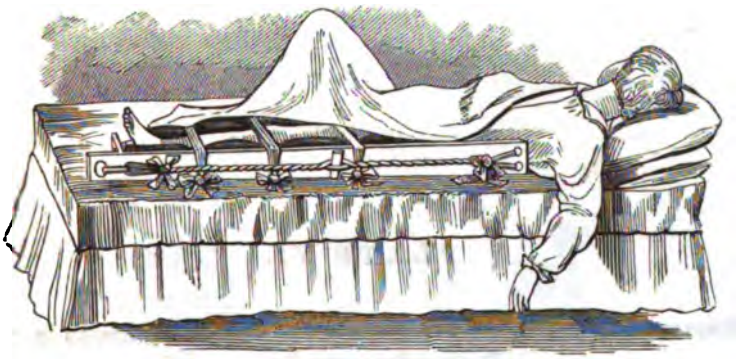


Fig. 2.

Fig. 3.

Fig. 4.

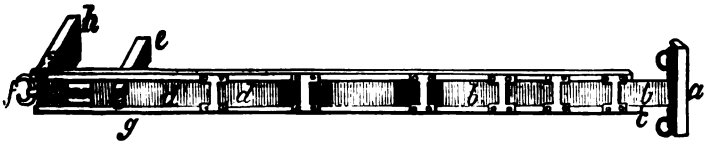


PLATE VI.

ENDLESS SCREW, USED BY THE AUTHOR FOR MAKING EXTENSION IN THE DOUBLE STRAIGHT SPLINT.

Fig. 1. Front view.

Fig. 2. Side view.

Fig. 3. End view. (*a*) is a screw working in a toothed wheel (*b*).

Fig. 4. Front removed, showing plane part of toothed wheel for extension strap. (*cc*). Two small screws to fasten extension strap.

Fig. 1.

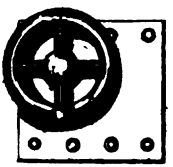


Fig. 2.

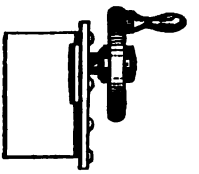


Fig. 3.

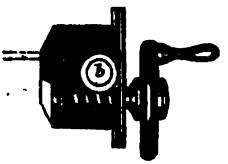
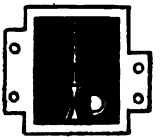


Fig. 4.



SCALE ONE-FOURTH OF FULL SIZE.

PLATE VII.

Fig. 1.—Nathan R. Smith's Apparatus.

This apparatus is constructed with especial view to lightness, cheapness and portability. It is also so constructed that it may be conveniently suspended.—*Gedding's Baltimore Med. and Surg. Journal*, vol. i. 1833; also *Sargent's Minor Surgery*, pp. 171–2.

Fig. 2.—B. Welch's Thigh Apparatus.

a. Upper extremity, broad and well cushioned so as to rest easily over against the side of the body. The breadth of this portion of the splint assists also in preventing its rotation. It is furnished with rings for the perineal band.

b. Brace for fixing a joint; to be used only in packing.

c. Screw for adjusting a sliding joint, for the purpose of lengthening or shortening the splint.

d. Thumb-screw for making extension.

The hollow splints suspended below can be moved upon each other by a joint opposite the ham, and their position secured by a movable bar. They may also be lengthened or shortened. There is a joint corresponding to the heel, and another opposite the sole of the foot.

This apparatus may be used as a double inclined plane, or as a straight splint. Lateral splints accompany the apparatus, all of which are made of gutta percha veneered with mahogany. They are moulded and flexible.

Fig. 3.—Josiah C. Nott's Double Inclined Plane.

In this apparatus the limb is secured to the splint by vertical pins and leather straps; the upper surface of the thigh splint is carved out a little, to fit the thigh; the two portions are articulated by a joint like that of a carpenter's rule, and this joint may be steadied by a horizontal bar underneath. For the rest, the drawing sufficiently explains itself.—*Am. Journ. Med. Sciences*, vol. xxiii. pp. 21–28.

Fig. 1.

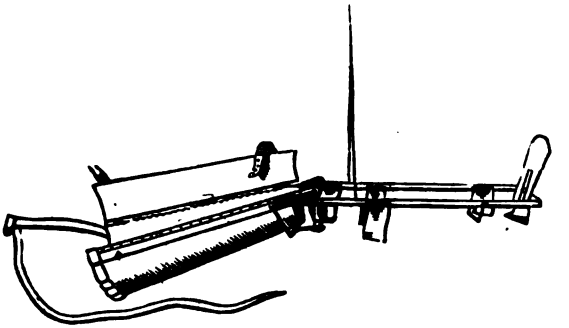


Fig. 2.

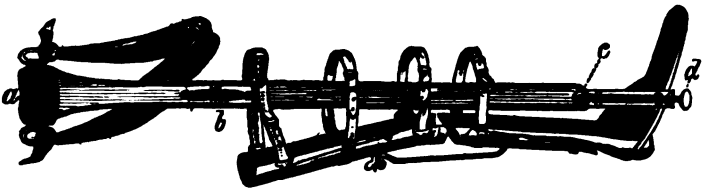


Fig. 3.

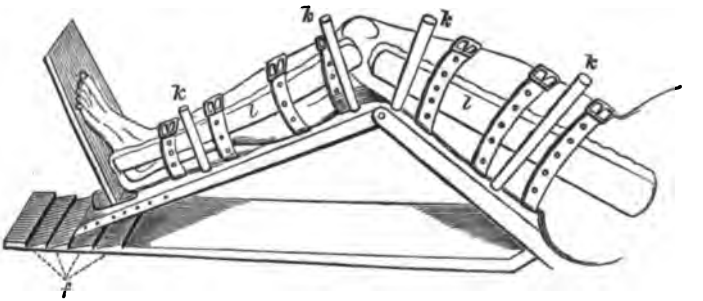


PLATE VIII.

L. A. DUGAS'S THIGH-SPLINT.

"Suitable compresses having been placed upon the thigh, apply over them four wooden splints a little shorter than the femur (one in front, one in the rear, and one on either side), and secure these with many-tailed bandages or with single ties. A two or three pound weight should then be fixed to the foot and hang over the foot-board of the bed, as indicated in the annexed figures, so as to keep up extension, while the resistance of the patient's body will effect counter-extension. A splint four inches wide, and extending from the side of the thorax to a little below the foot, will now serve to keep the limb straight and to maintain the foot in a proper position. This splint should be secured by separate ties passed around the abdomen, pelvis, thigh, leg, and foot. Finally, an arch of crossed hoops should protect the toes from the bedclothes."—See *Southern Med. and Surg. Journal*, Feb. 1854, p. 69.

Fig. 1. The long splint is omitted because it would mask the drawing.

Fig. 2. Illustrates the mode of securing the weight without fatigue to the ankle-joint.

Fig. 1.

Fig. 2.

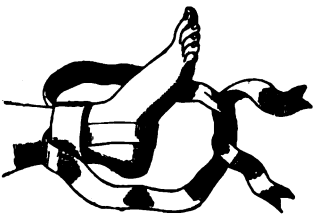


PLATE IX.

JAMES L. VAN INGEN'S THIGH APPARATUS.

Fig. 1. *a, b, c, d, e.* Small blocks or bricks to elevate the lower bed-posts, making an inclined plane of the whole bed.

8. A piece of board, one to two inches broad, nailed to the posts of an ordinary bed, to which the straps of the half-gaiter are attached. From this bar, or narrow strip of board, extension is made.

o. A very small oval pillow under the knee.

i. A wedge-shaped pad or pillow under the lower part of the leg, and terminating just above the heel.

Fig. 2. *a, b, c, d.* Bricks or blocks, same as in Fig. 1.

o, e. Pads or pillows, same as in Fig. 1.

i, i. A strip of cotton cloth, or of adhesive plaster, laid along each side of the limb, split at the lower end, and fastened to the foot-board, after having been secured to the leg by a few turns of the roller. This may be substituted at pleasure for the half-gaiter seen in Fig. 1.

Fig. 3. Same as Figs. 1 and 2; with *b, b, b,* splints of coaptation sewed in a splint cloth, to be used in fractures of the leg; and *g, g, g,* to be used in fractures of the thigh. Over the whole are lines representing a Scultetus bandage.

The pillow under the head should leave the neck and shoulders quite free, to allow the body to produce counter-extension.

Fig. 1.

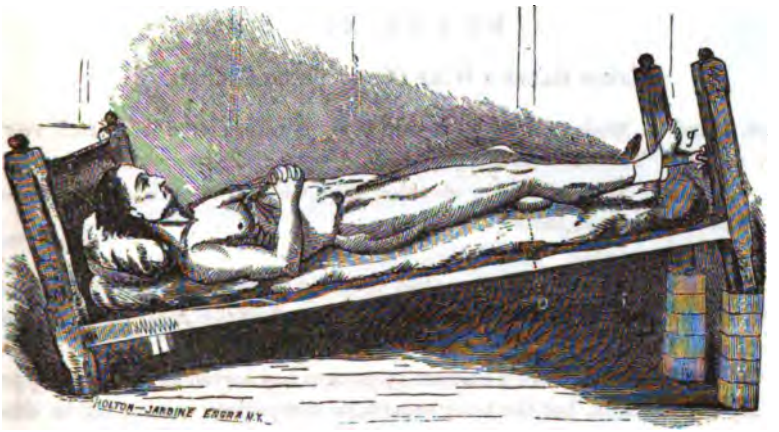


Fig. 2.

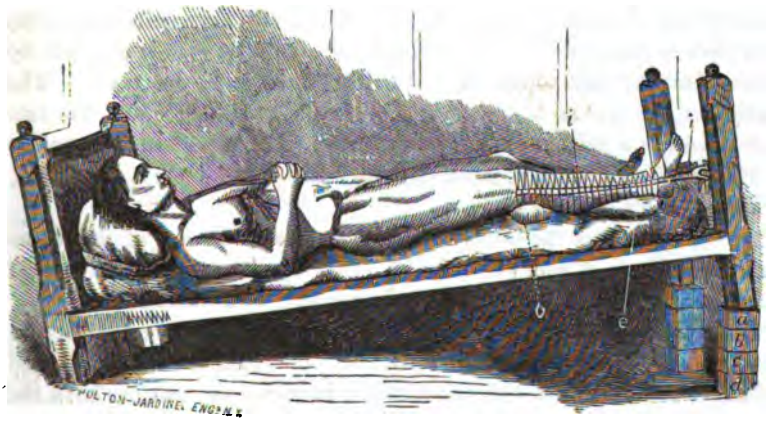


Fig. 3.

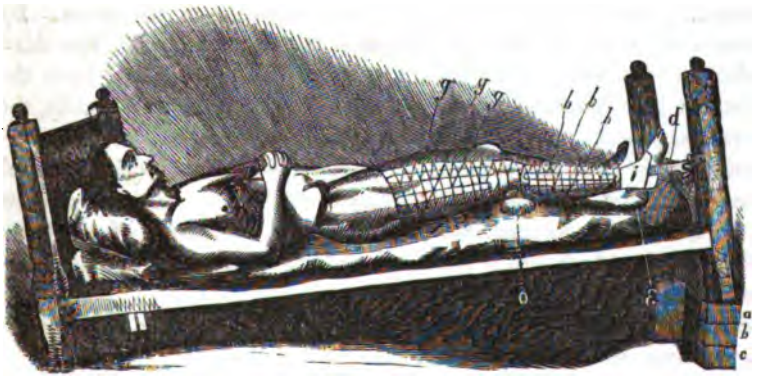


PLATE X.

Louis Bauer's Wire Cloth Thigh-Splints.

Figs. 1 and 2. Made of iron wire, tinned by a galvanic process, and varnished. The wire cloth is surrounded by wire frames to increase its firmness. The splints are moulded upon casts so as to adapt them to the shape of the limbs.

We copy the following paragraphs from an account of this apparatus written by the inventor, and published in the *Buffalo Medical Journal* for April, 1857, vol. xii.:—

"Dzondi and Hagedorn's fracture apparatus has served as the prototype of my construction, but the most superficial comparison cannot fail in discovering the superior advantages of my apparatus over the former.

"My apparatus consists of a thick wire frame, similating in its form the posterior half of a pair of pants. Corresponding with the anus a sufficiently large piece is removed for alvine evacuations. Both legs are kept apart by an iron bar, through which, on either side, three holes are made. The middle one, the widest, is designed to receive a stout screw, and the two lesser openings a small piece of stoutish wire. The three being riveted to an iron foot-board, serve to move the said foot-board up and down, in all, perhaps, a space of three inches.

"In order to place the patient into my apparatus for any of the aforementioned objects, it is to be filled with loose cotton wool, and the calf of the affected or fractured limb, is to be surrounded by a lace stocking.

"So prepared, the patient is put into the apparatus; the foot of the sound member is to be firmly set upon the foot-board, the limb stretched and kept in this position with bandage and knee-cap, surrounding both the whole limb and the instrument, thus preventing the said limb from flexing. The fracture is then adjusted and the extension made by buttoning the lace stocking to the foot-board, the foot being bandaged on the latter. By means of the screw the degree of extension must be regulated. The thigh is then to be covered with a small wire splint in the front, and both the splint and limb fastened by a roller upon the apparatus; and, finally, the pelvis is kept down by a belt. This is the whole, and it will be easily perceived that the limb, thus secured, cannot move in the least, or the fractured bone be displaced. For the purpose of alvine evacuations, the lower portion of the apparatus is so much raised as to permit the placing of a bed-pan under the posteriors, which can be done without any apprehension concerning the security of the limb."

Dr. Bauer does not claim to have invented wire splints, but only that he has improved upon previous inventions.

Fig. 1.

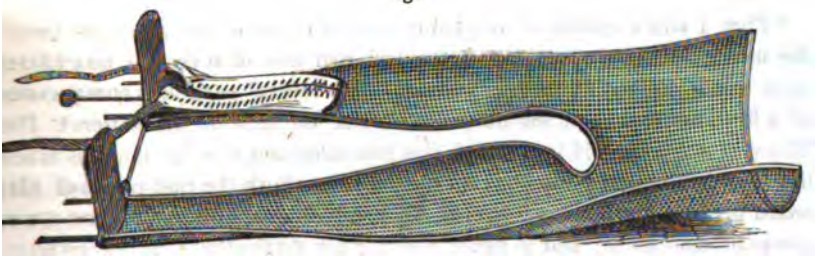


Fig. 2.

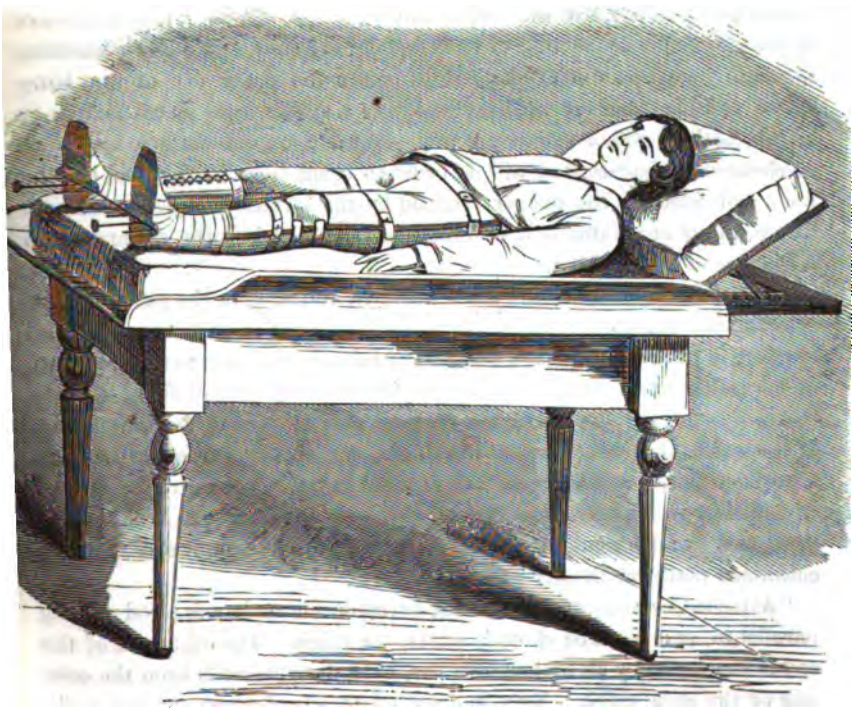


PLATE XI.

J. H. Hobart Burge and Brother's Thigh Apparatus.

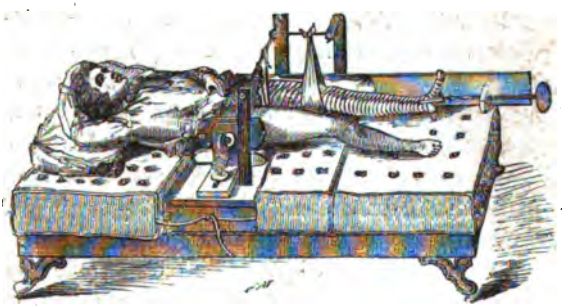
"Figs. 1 and 2 consist of two short mattresses, constituting respectively the upper and lower portions of the bed, and also of a central portion, upon which rest the hips of the patient. This central portion is composed of a firm, but easy, hair cushion, upon which the hips of the patient lie. This cushion is secured to a board, one foot wide and two feet long, which lies transversely under the body of the patient. Both the cushion and the board present, at the lower margin, a large V-shaped opening, for convenience of defecation; and in order still further to facilitate this function, the cushioned board is elevated several inches upon a second platform, by a strip of board at each end, thus providing a shelf for the bed-pan, which is introduced through an opening formed by withdrawing a section of the lower mattress. Upon the cushioned platform, on each side of the cushion, is a rectangular wooden slide. These slides are so arranged as to be separated or approximated at will, and, by a thumb-screw which passes through a fissure in the horizontal portion of each, may be fixed at the desired point, so as exactly to embrace the pelvis of any patient. There is, also, a fissure in the perpendicular portion of each rectangular slide, and a screw passing through the same: one of these is to secure the upper end of the long splint, and the other for the attachment of a splint, eight or ten inches in length, both of which splints are well padded upon one surface, and may be elevated or depressed at will, in order to bring them to the level of the limb, and fixed at the proper altitude by the screws already mentioned. These splints are mutually transferable in order to adapt the apparatus to a fracture of either thigh.

"For the sake of distributing the pressure, and making the patient more comfortable, two counter-extending pads are provided, and to prevent all pressure in the groin these are attached by leather straps to the upper surface of the cushioned platform, upon which the patient rests, and about thirteen inches apart. Passing under the cushion, and traversing the tuberosities of the ischia, they pass between the thighs, and thence, perpendicularly, to a horizontal iron rod, at an altitude of eight or ten inches above the patient, transversely to his body, and directly opposite the perineum. This rod is supported by a perpendicular bar at either end, extending upwards from the cushioned platform already mentioned.

"Attached by one extremity to the horizontal cross-bar, is a rod running parallel to, and situated directly above, the thigh. The other end of this rod is supported by an arched iron bar, extending upwards from the outer side of the long splint. This is designed to afford direct support to the injured limb, whenever such support is deemed advisable, and to assist in

Fig. 1.

Fig. 2.



preserving the arched form of the femur. A silk handkerchief, or one or two belts, of suitable width, are to be passed around the limb (either internally or externally to the splints of coaptation), and fastened to the horizontal rod. The splints of coaptation are not represented in the engravings: they are to be applied according to the exigencies of the case, and the views of the surgeon in attendance.

"The extension is made, as is usual in the straight position, by means of the screw, adhesive plaster and roller."

PLATE XII.

Figs. 1, 2, 3.—E. Daniel's Fracture-Bed.

"The nature of the invention consists in the peculiar construction of the bedstead, by which the position of the patient may be changed as often as desired without any annoyance or inconvenience, and the lower limbs operated upon with great facility.

"*A* represents a platform of a suitable length and width, and supported by four legs, *a*. To the upper surface of the platform *A*, there is attached a cross-piece, *b*, at a short distance from the centre, and directly through the centre of the platform there is made a circular hole or aperture, *c* (in dotted lines), said hole or aperture having a semicircular cut or recess in the cross-piece *b*. To the straight edge of the cross-piece *b*, there is attached by hinges, *d*, a board, *B*, termed the body plane, the width of which may correspond with that of the platform *A*, and when depressed its outer edge may be even with the edge of the platform. The sides of the body plane may be elevated or raised so as to be slightly concave on its outer surface. To the opposite side or edge of the cross-piece *b*, and at each side of the semicircular cut or recess formed by the hole or aperture *c*, there are attached by hinges, *e*, cast-iron plates, *C C*, which are provided with grooves or ways at their sides, in or between which plates, *D D*, work. The plates *C C*, *D D* (one on each side), are thigh planes, and their edges are provided with ease or projections, *f*, in which a shaft, *g*, works, one on each plate, *C*. On each shaft, *g*, there is placed a pinion, which gears into a rack attached to the under surface of the plates *D D*. At one end of the shafts, *g*, there are attached ratchets, *g'*, in which pawls, *j*, catch, said pawls being attached to the sides of the plates *C C*. To the outer edges of the plates *D D*, there are attached by hinges, *k*, boards, *E E*; these boards are leg planes, and are slightly raised at their inner ends, where they are connected to the plates *D*, in order to form depressions to correspond to the shape of the legs. To the under surface of each leg plane there is attached a metal guide, *l*, in which a rack, *m*, works; the outer ends of the racks have bars, *n*, projecting from them at right angles. To each leg plane there is attached a shaft, *o*, having a pinion, *p*, and ratchet, *q*, thereon, and pawls, *r*, which catch into the ratchets, *q*, the pawls being attached to the outer sides of the leg planes. The pinions gear into the racks *m*. The body plane, and also the thigh and leg planes, are covered by a suitable mattress, *E*, with a hole made through it to correspond with the hole or aperture, *c*, in the platform *A*, and the mattress is slit or cut to cover properly the thigh and leg planes without interfering with their movements. To the under side of the platform *A*, there is attached by hinges a flap *F*, having a stuffed pad or cushion, *t*, upon it, which, when the flap *F* is secured upward against the platform *A*, fits in the hole or aperture *c*, in the platform and mattress. The flap is secured against the platform by a button, *u*."

Fig. 1.

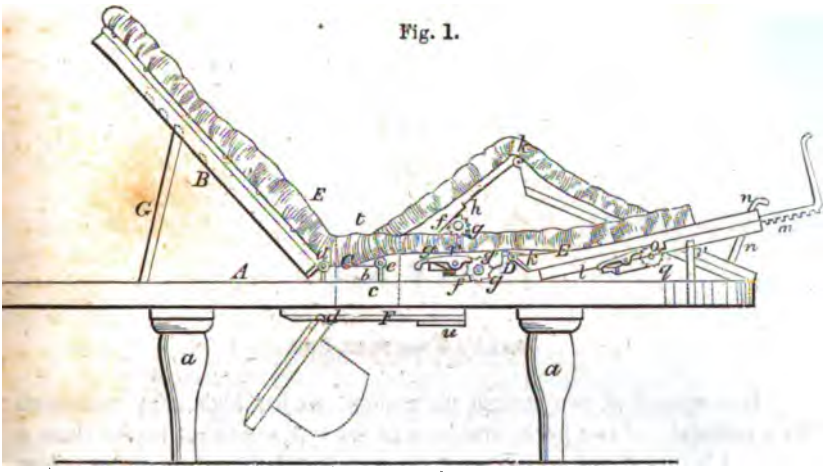


Fig. 2.

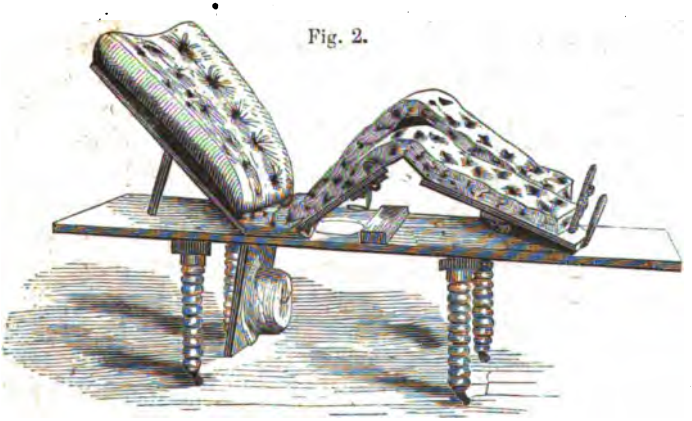


Fig. 3.

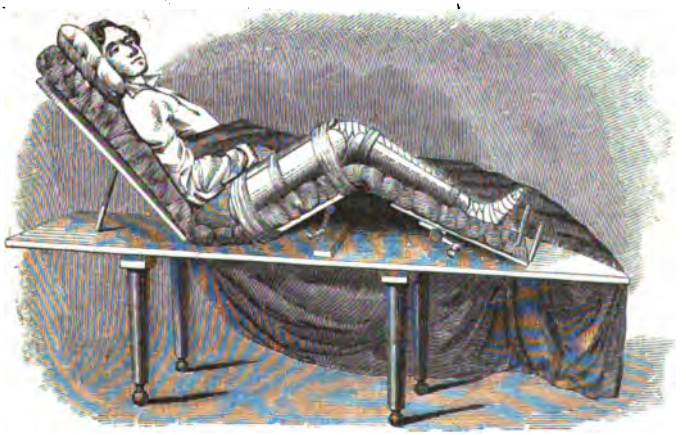


PLATE XIII.

JENKS'S FRACTURE-BED

"Is composed of two upright posts about six feet high, supported each by a pedestal; of two horizontal bars, at the top, somewhat longer than a common bedstead; of a windlass of the same length placed six inches below the upper bar; of a cog-wheel and handle; of linen belts, from six to twelve inches wide; of straps secured at one end of the windlass, and at the other having hooks attached to corresponding eyes in the linen belts; of a head-piece made of netting; of a piece of sheet iron twelve inches long, and hollowed out to fit and surround the thigh; of a bed-pan, box and cushion to support it, and of some other minor parts.

"The patient lying on his mattress, and his limb surrounded by the apparatus of Desault, Hagedorn, or any other that may be preferred, the surgeon, or any common attendant, will only find it requisite to pass the linen belts beneath his body [attaching them to the hooks on the ends of the straps, and adjusting the whole at the proper distance and length, so as to balance the body exactly], and raise it from the mattress by turning the handle of the windlass. While the patient is thus suspended, the bed can be made up, and the fæces and urine evacuated. To lower the patient again, and replace him on the mattress, the windlass must be reversed. The linen belts may then be removed, and the body brought in contact with the sheet."—*Gibson's Surgery*, vol. i. p. 320.

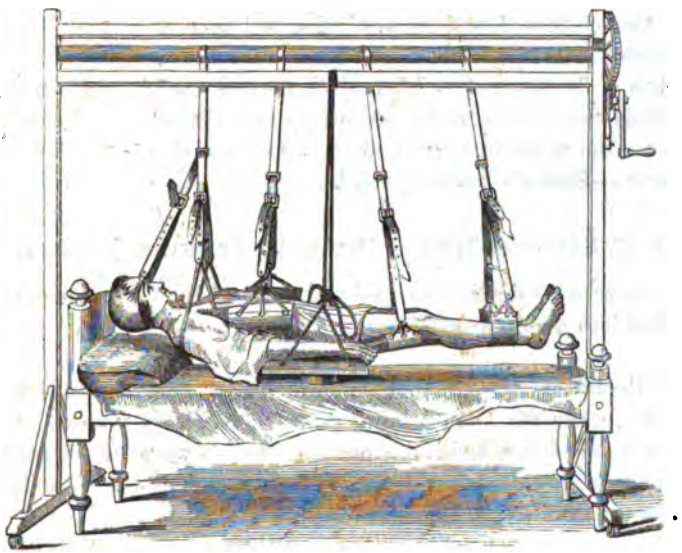


PLATE XIV.

JOHN SYNG DORSEY'S PATELLA SPLINT.

Fig. 1. This apparatus consists of a piece of wood half an inch thick and two or three inches wide, and long enough to extend from the buttock to the heel; near the middle of this splint, and six inches apart, two bands of strong doubled muslin, a yard long, are nailed. The splint is then cushioned, and the limb being laid upon it, a roller being first applied from the ankle to the groin, encompassing the knee in the form of the figure of 8; after which the two muslin bands are secured across the knee in such a manner as that the lower one shall draw down the upper fragment and the upper one elevate the lower fragment.—*Dorsey's Surgery*, vol. i.

E. K. SANBORN'S MODE OF DRESSING A FRACTURED PATELLA.

Fig. 2. Represents the limb covered with a broad band of adhesive plaster lifted into a loop over the knee.

Fig. 3. Represents the band of adhesive plaster secured in place by a roller, while the loop is being drawn together by torsion. Underneath the plaster, and just above the upper fragment of the patella, a compress is placed to aid the adjustment.—*Boston Med. and Surg. Journal*, vol. liv. p. 174.—*See Report*, p. 339.

Fig. 4. THE AUTHOR'S MODE OF DRESSING A FRACTURED PATELLA.

a. Bed.

b. Floor of splint.

c. Foot-piece, furnished with fenestra through which straps may be passed to secure the foot, and with pins on each margin.

d. Single inclined plane fastened to the foot-piece at any height by means of a hook dropped over the pins.

e, *e*. Cushion: thicker under the knee than at either end.

f. Roller to secure leg and thigh to the inclined plane: not completely applied.

g. Adhesive plasters laid over a compress and crossed under the splint. Those from above pass through a notch in the splint below the knee.

h, *h*. Ends of the compresses, seen from under the adhesive plasters.—*See Report*, pp. 340, 341.

Fig. 1.

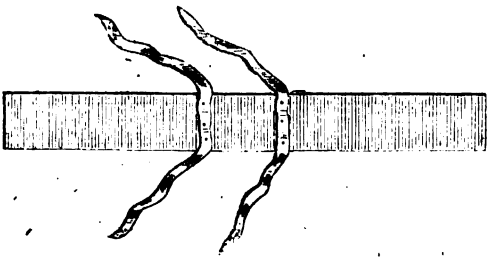
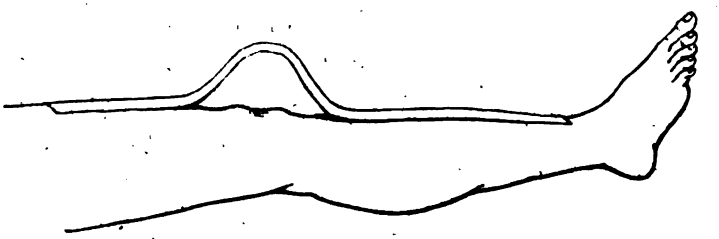


Fig. 2.



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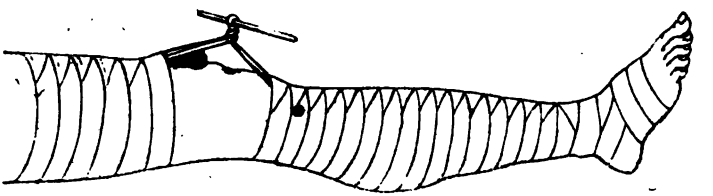

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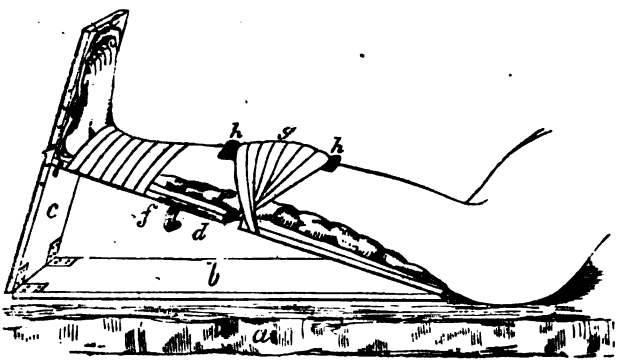


PLATE XV.

FIG. 1.—JAMES HUTCHINSON'S SPLINT FOR EXTENSION, ETC., IN FRACTURES OF THE LEG.

Composed of two wooden splints, long enough to extend from the knee to six or eight inches below the foot, furnished with a foot-piece for extension, and four holes above for counter-extension.—*Elements of Surgery, by John Syng Dorsey*, vol. i. p. 181. Philadelphia, 1813. (See my remarks on this splint in body of the Report.)

JOHN NEILL'S APPARATUS FOR FRACTURES OF THE LEG, REQUIRING EXTENSION AND COUNTER-EXTENSION.

FIG. 2.—APPARATUS FOR SIMPLE FRACTURES.

"For simple fractures of both bones of the leg, attended with shortening and deformity not easily overcome, the limb should be placed in a long fracture-box, with sides extending as high as the middle of the thigh, and a pillow should be used for compresses.

"The counter-extension is made by strips of adhesive plaster, one and a half inches in breadth, secured on each side of the leg below the knee, and above the seat of fracture, by narrower strips of plaster applied circularly. The end of the counter-extending strips may then be secured to holes in the upper end of the sides of the fracture-box, by which the *line of the counter-extension is rendered nearly parallel with the limb.*

"The extension is also to be made by adhesive strips, in a mode which is now well known and understood. The ends of the extending bands may be fastened to the foot-board of the box."—*Philadelphia Med. Exam.*, vol. xi. p. 580, 1855.

FIG. 3.—APPARATUS FOR COMPOUND FRACTURES.

"In compound fractures of the leg, shortening and deformity are often difficult to overcome, as is well known to experienced surgeons. In such cases we may wish to dress the wounded soft parts, and, at the same time, maintain a certain amount of extension and counter-extension.

"This can be readily accomplished by having the sides of the fracture-box sawed in two parts at the knee, so that the sides of the box above the knee, from the upper ends of which the counter-extension is made, need not be disturbed during the dressing, while that portion of the side of the box, corresponding to the leg, may be opened at pleasure, without diminishing the tension of the extending or counter-extending bands."—*Phil. Med. Exam.*, vol. xi. p. 581. (See also, p. 582 of same volume for an ingenious mode of making extension and counter-extension at the same moment, in fractures of the thigh, invented by Dr. Neill.)

Fig. 1.

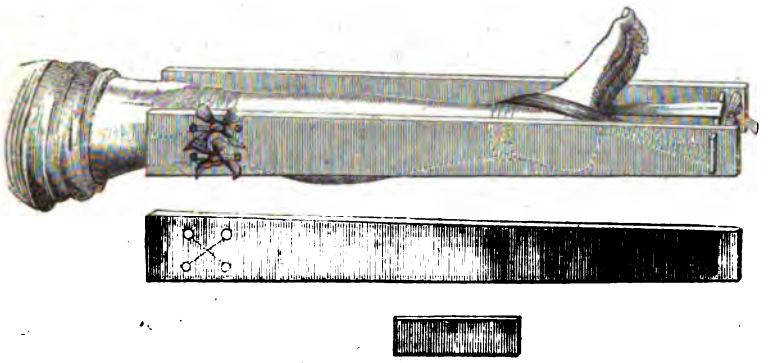


Fig. 2.

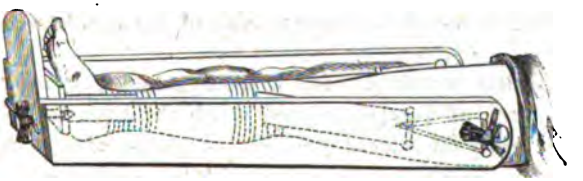


Fig. 3.

PLATE XVI.

R. O. CRANDALL'S APPARATUS FOR EXTENSION AND COUNTER-EXTENSION IN FRACTURES OF THE LEG.

Fig. 1. Section of the apparatus, applied to the limb; showing adhesive plaster counter-extending band, gaiter for extension, &c. Adhesive plasters are also used for extension.

Fig. 2. Posterior view of the lower portion of the apparatus.

Fig. 3. Apparatus complete. The counter-extending straps are passed over a block of wood supported above the knee, to prevent their pressure upon the sides of the knee.—*Philada. Med. Journ.*, vol. iv. p. 193, Jan. 1856; also *Transactions of the Med. Assoc. of Southern Central N. York*, 1855, pp. 81–2.

Fig. 1.

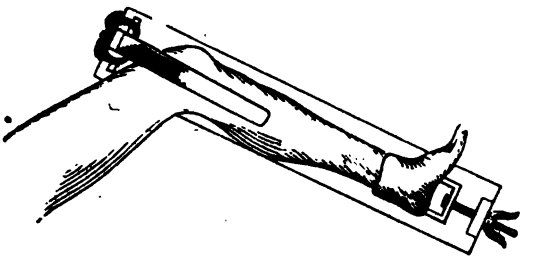
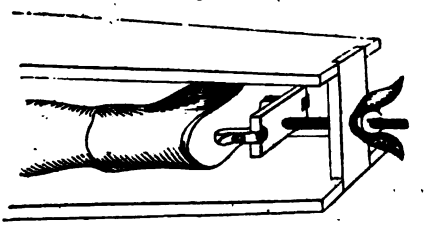


Fig. 2.



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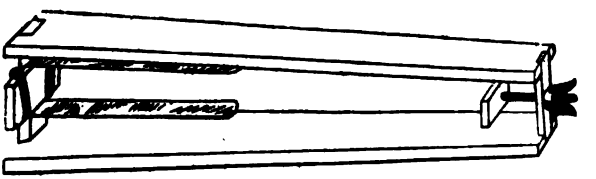


PLATE XVII.

FIG. 1.—B. WELCH'S SPLINTS FOR FRACTURES NEAR THE ANKLE-JOINT.

FIG. 2.—B. WELCH'S JOINTED APPARATUS WITH FLEXIBLE SIDE SPLINTS FOR FRACTURES OF THE LEG.

"This may be flexed or extended, and fixed in the position required by the hinges. This is done by means of pinion-like teeth at the circumference of the hinges, which are held in contact by screws, forming the pivots of the joints. It is fitted to limbs differing in length by sliding joints at the sides of the limb, and in the splint which supports the under side of the limb. The depth is increased or diminished by turning a screw at the bottom of the foot-piece. Flexible side splints are confined by a bandage to the sides of the limb; another may be placed on the top of the thigh to support the thigh straps."

FIG. 3.—LOUIS BAUER'S WIRE SPLINTS FOR THE LEG.—*Buffalo Medical Journal*, April, 1857, vol. xii.

Fig. 1.

Fig. 2.

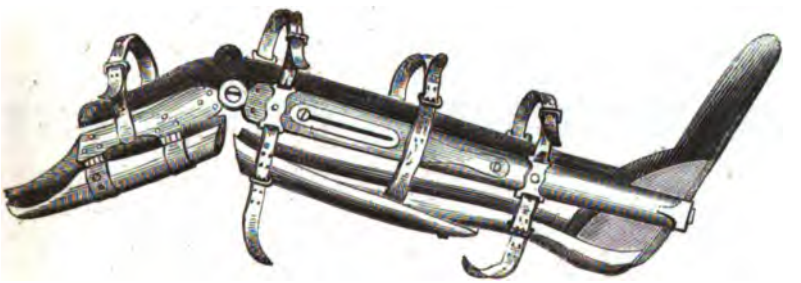
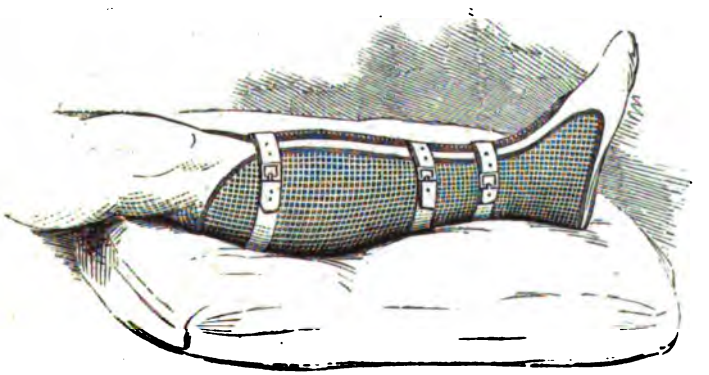


Fig. 3.



PARTIAL REPORT

ON THE

NERVOUS SYSTEM IN FEBRILE DISEASES.

BY

HENRY F. CAMPBELL, M.D.,

OF GEORGIA.

PARTIAL REPORT[1] ON THE NERVOUS SYSTEM IN FEBRILE DISEASES.

THE CLASSIFICATION OF FEBRILE DISEASES BY THEIR RELATION TO THE NERVOUS SYSTEM.

DURING the examination of our subject since the time of our appointment as a special committee, by this Association, we have been, at each step, more and more impressed with its importance, and at the same time with the extreme difficulty attending its full, clear, and thorough elaboration. "A man," says Lord Bacon, "must collect facts, in order to know the *law* of facts;" diligently and earnestly engaged for the year past, in collecting and interrogating the facts which have a bearing on the important subject of Febrile Diseases, in the relation assigned us for examination, we have scarcely had time to do more than *note*, here and there, the gleam of truth which has been evolved during a bare hasty collocation of data; much less to determine satisfactorily any fixed law in relation to the vast subjects involved in the investigation. That such laws will be recognized, and that the careful generalization of the facts will be productive of important, fruitful results, we have already seen enough fully to persuade us. Pleading then the magnitude, as well as the embarrassments of the subject, we ask of this Association the privilege of having our special committee continued for another year, allowing us at present to lay before this body a few conclusions arrived at, as the result of the investigation in its present state of progress.

I. As all the normal phenomena of the living organism are known to occur under the superintending influence of the nervous system, and are dominated by it, so it is but rational to regard all morbid actions as being more or less influenced in their manifesta-

[1] The Committee on "Nervous System in Febrile Diseases" has been continued.

tions by *aberrated* nervous action. In that class of diseases ordinarily designated fevers, our researches and observations have led us to the confident belief that the above law applies with sufficient prominence to constitute the basis of their classification, and we would here respectfully claim for it, that it is the only *reliable* basis of their classification, and further, that in its more extended application, it will hereafter be found to constitute what may be called par excellence, *the Law of Febrile Diseases.* Simply to assert the recognition of this law, and to suggest a new and more comprehensive classification of Fevers based upon it, is the sole object of the present brief exposition.

II. As in the Nervous System, we recognize two grand departments, viz: 1st. The Cerebro-spinal System, all the normal actions of which are subject to cessations and interruptions; and, 2dly. The Ganglionic System, all the normal actions of which are of a continuous and *un*interrupted character, so in the manifestations of febrile diseases, do we distinctly recognize two grand distinguishing characteristics respectively typifying the *normal* actions of these two systems of nerves: thus, a character of *paroxysm* obtains in certain cases, while a character of *continuousness* as plainly marks the others.

III. Again: as in the Cerebro-spinal System, we find that its normal action pertains almost exclusively to sensation and to motion, with only a secondary and comparatively somewhat remote influence (which we have termed Excito-Secretory) upon nutrition and secretion, while in the normal action of the *Ganglionic* System the entire function is known to be, to preside over nutrition and the secretions; so in *paroxysmal fevers* do we find intense pain, modified sensation, and symptoms allying them to neuralgic and convulsive diseases very prominent, while in *continued fevers*, modified nutrition and altered secretion, are the marked and most prominent characteristics. We would, therefore, *announce* as our classification of febrile diseases, two grand divisions of fevers corresponding with the two grand divisions of the nervous system, thus:—

I. CEREBRO-SPINAL FEVERS.

All *Paroxysmal.* The secretions and nutrition only *secondarily* affected.

II. GANGLIONIC FEVERS.

All *Continued.* The secretions and nutrition *primarily* affected.

I. Under the head of CEREBRO-SPINAL FEVERS, we would place the whole family of Paroxysmal Fevers, whatever type they may assume,[1] and, also, the various forms of neuralgia, which are nearly always intermittent, as well as the *sthenic* forms of Traumatic Fever, together with the Fever accompanying simple Pharyngitis, Pneumonitis, Dysentery, and many other diseases of malarial districts.

II. Under the head of GANGLIONIC FEVERS, OR FEVERS OF THE SECRETORY SYSTEM OF NERVES, we think that we find ample ground for bringing together many diseases heretofore widely estranged from each other. Thus, as the archetypal form of ganglionic fevers, we place at the head of the list, typhus and typhoid fever,[2] then, allied to these in various degrees of affinity, but all *equally*, in the one essential element, that *they present themselves as manifestations of disease through the Ganglionic System*, are variola, scarlatina, rubeola, varicella, and many other forms of eruptive fevers, heretofore not classified by nosologists. All of these last diseases are marked by fever of a *continued* or *non paroxysmal* character, all present marked aberrations of nutrition and secretion, and each has its own peculiar eruptive character; and, further, each one is definitely *self-limited in its duration*, as yet, no remedial interference having been found competent to arrest or shorten their progress.

We will here make the remark, that we do not wish to be mistaken as classifying these diseases in relation to their eruptive feature, but only as signifying a recognition of the common influence of the secretory system of nerves in all of them *by* the eruption. In typhoid fever itself, it must be recollected that the *eruption* is not a prominent feature, and yet, we consider the secretory system of nerves primarily deeply affected, and place this at the head of the list, notwithstanding the fact, that the ganglionic implication mani-

[1] The primitive location of these fevers, in the cerebro-spinal system, was developed by Prof. L. D. Ford, of the Medical College of Georgia, in the *Southern Medical and Surgical Journal*, in 1836, and called by Maillot, "Cerebro-spinal Intermittent Irritations."

[2] As first developed in an essay entitled: "*An Inquiry into the Nature of Typhoidal Fevers, based upon a Consideration of their History and Pathology*," presented to the American Medical Association, at its Session of May, 1853, by Henry F. Campbell, Chairman of Committee on Typhoid Fever. The implication of the ganglionic system of nerves, in typhus and typhoid fever, has been, in the above essay, argued *at length*.

fests itself *but little* upon the skin and mainly in the intestinal canal.[1]

It may be asked, if all of these fevers are due to aberration in the innervation of the ganglionic or secretory system of nerves, why should they present such marked specific differences? A satisfactory answer may be given thus: that specificity of morbific cause must rationally be expected to secure a specificity of morbid manifestation; thus, the virus of variola, when taken into the system, gives rise to the morbid manifestations peculiar to smallpox, while the morbific influence (of whatever nature it may be) of typhoid fever, produces a specific form of disease entirely different, but not the less for that reason, locatable in parts of the organism entirely controlled by the secretory nervous system.

BLENDING OF TYPES OF FEVER.—Much interest has been taken by this Association, for the last five years, in the subject of the Blending of the Types of Fever. We would claim, for the present Pathology and Classification of Fevers, that it is the *only* one which admits of any plausible explanation of the mysterious phenomena comprehended under the term, "Blending of Types;" thus, a cerebro-spinal or *paroxysmal* fever may assume, under certain circumstances, some of the characteristics of some one or other of the forms of *continued* fever. This we hold can be explained by attributing it to a propagation of the irritation, originally located in the spinal marrow, to the ganglia of the secretory system. Then, again, the reverse may obtain; we may find, and do often find, in *continued* fevers, especially in malarious districts (whether the case be typhoid fever, rubeola, or scarlatina), *intermittent* paroxysms, interrupting the even course of the *continued* form, sometimes obscuring the diagnosis, and making it necessary to modify the treatment. The use of quinine, it is well known, will generally break up these *paroxysms*, but not in the least modify the course of the *continued* fever. In the first of these cases, the morbific influence has been "*centripetal*," and in the second "centrifugal," and thus the "blending of types" may be rationally and philosophically explained.

We are aware that, in presenting thus a condensed exposition on the obscure subject of "The Nervous System in Febrile Diseases," without more argument and fuller elaboration, we are running the risk of being charged with "bare assertion," but we will honestly

[1] See Inquiry, &c., pp. 53 and 54.

vow, that each proposition has been earnestly and carefully consi-lered, keeping constantly in view all the phenomena of febrile liseases—comparing them faithfully with the normal actions of he two grand departments of the nervous system.

It will be remarked, that we have not attempted to define what s the exact morbid condition of the nervous centres, or of the nerves, which gives rise to the phenomena in the two classes of ever. Such a process of reasoning we have carefully abstained rom, because such a discussion would be conversant about sub-ects which cannot as yet be said to have been brought within the legitimate domain of science. We can only as yet trace the effects to their causes; it is a different thing to discuss the nature of the causes themselves; and as Professor Whewell has made a distinc-tion between the *Laws* of Phenomena and the *Causes* of Phenomena, so we only here claim to have recognized a *Law*, leaving the more recondite inquisition into the *Causes*, for a more advanced and en-lightened age of science. In conclusion, we will say, we may have been, in the above exposition, unfortunately obscure in presenting to others what has become a clear and well defined conviction to us; but in the pertinent language of another,[1] whose deep philoso-phy has charmed us, while it has been of unspeakable service to us in many of our investigations, we will say, that "to our mind this doctrine stands firm and impregnable—assailable by no known fact consistent with every established truth."

[1] Dr. M'Cosh, on the Method of the Divine Government.

PRIZE ESSAY.

THE

EXCITO-SECRETORY SYSTEM OF NERVES.

ITS RELATIONS TO

PHYSIOLOGY AND PATHOLOGY.

BY

HENRY FRASER CAMPBELL, M. D.,

PROFESSOR OF SPECIAL AND COMPARATIVE ANATOMY IN THE MEDICAL COLLEGE OF GEORGIA, ETC. ETC.

Observation becomes experiment when used in severe processes of induction.—VICTOR COUSIN.

MAY, 1857.

PRIZE ESSAY.

THE EXCITO-SECRETORY SYSTEM OF NERVES.

THE object of the present essay, is to develop more fully a function of the nervous system, which, though enunciated and described nearly seven years ago in this country,[1] is only now beginning to be fully recognized by the profession in Europe.[2] We refer to that function which has been termed the *Excito-secretory*,[3] and which results from the relation subsisting between the excitor or sensitive nerves of the cerebro-spinal and the secretory branches of the ganglionic system. It is by virtue of the particular system of nerves thus resulting, as we hope to demonstrate in the present paper, that a great many of the important acts of nutrition and secretion are modified in circumstances both of health and disease, and further, that it is to aberrations in this particular function that many of the heretofore, mysterious phenomena of diseased action are mainly attributable.

The prosecution of this very interesting inquiry is necessarily embarrassed by many difficulties. The generalization of kindred facts, long established in other relations, and made the basis of induction in those relations, when they are now transferred to an

[1] The Influence of Dentition in producing Disease. By Henry F. Campbell, M.D., Demonstrator of Anatomy in the Medical College of Georgia. Medical and Surgical Journal, vol. vi. p. 321. June, 1850.

[2] London Lancet, American edition. March, 1857. Excito-Secretory System of Nerves. By Marshall Hall, M. D., F.R.S., &c.

[3] Vide Transactions of the American Medical Association, vol. vi., art. Sympathetic Nerve in Reflex Phenomena. By Henry F. Campbell, of Georgia. May 3d, 1853.

entirely new position, and made to serve as data for evolving a new result, in many instances opposed to those of their former interpreters, will give to our reasoning a character of novelty, which we fear may be stigmatized as *innovation* by those holding adverse opinions to our own. Then, again, the data for our deductions being scattered throughout the vast domain of medicine, and oftentimes associated with other facts which are entirely irrelevant, it is a matter of no small labor to dissolve these associations, and to place them in their proper and pertinent relations for the deduction we wish here to accomplish. We will, notwithstanding, give ourselves to the uninviting task, even with these forbidding aspects of it frowning upon us, for we are impelled to it by the reflection, that the field is a rich one, that the fruit is ripe and ready for harvest, that the data accumulating for years need only a proper interpretation to make them yield the very results we hope to draw from them, and further, that did *we* not perform the present duty, many years cannot elapse before some other will give himself successfully to the same important work.

THE NERVOUS SYSTEM.

The Nervous System, as has been long admitted, is divisible into two grand portions, the Cerebro-spinal and Ganglionic, or to speak physiologically, the nerves of animal life, and the nerves of organic life. In the perfect being, endowed with these two systems of nerves, a multitude of facts, the result both of observation and experiment, go far to establish the belief, that though evidently performing functions in the animal economy of very diverse characters, these two portions are yet intimately connected with each other, and further, that such connection in function, as well as in physical relation, is indispensable to animal unity in those beings who possess both these departments of the nervous system.

As in the following essay we shall be required constantly to refer to the actions of these two systems of nerves, it will not be improper, in the beginning, to recall briefly a sufficient number of the admitted facts in relation to their functions, to establish a clear view of their respective parts in the animal economy. Firstly, then, it is to the cerebro-spinal system, with its varied endowments of sensation, motion, special sensation, and perhaps, even intellec-

tion,[1] that the being owes his adaptedness for a relation with the objects of the external world. Between the various portions of this great system, while there exist separations and distinctions of the most obvious character, there are also relations mutual and intimate, which are of the first importance to the individual. The senses, endowing him with the æsthetic faculty, enable him to spread before him on the field of consciousness, all which is passing in the world without, while the internal, or intuitive phenomena, complete the contents of this same field.[2] Thus, the sensible world without, and the world of intellect within, according to some,[3] are pictured upon a canvas or blank sheet, and presented to the reason and the judgment, as data by which the being may direct and shape his conduct under the influence of a supreme principle of our organization, the Will. These constitute the voluntary acts of animal life. Then, on the other hand, there are certain muscular acts, equally amenable to the dictates of the will, which are performed independently of the cerebral organs apparently, and without putting in requisition either reason, judgment, or the will, under the influence of the, so to speak, vicarious power of reflex action. This last set of phenomena constitute a body of facts, classed under the general term of excito-motory action, and for the full development of which, science is indebted to the genius and labors of Doctor Marshall Hall.[4]

The other portion of the nervous system, termed the Ganglionic, Sympathetic, or Organic Nervous System, was, for a long time, a mystery to physiologists, and therefore became the subject of much observation and experiment. The views of Willis,[5] Vieussens,[6] Lancisius,[7] Winslow, Meckel,[8] Zinn,[9] and Scarpa,[10] having finally given place to the more rational suggestions of Bichat[11] and

[1] Herbert Mayo, on the Nervous System. "Mind and Matter," Sir Benjamin Brodie.

[2] Consciousness is the accompaniment of all our faculties, and, so to speak, their echo. . . . . Consciousness is nothing else than the rebound of the action of all our faculties.—Victor Cousin, *History of Modern Philosophy*, vol. i. p. 322.

[3] Locke.

[4] Lectures on the Nervous System and its Diseases. London, 1836.

[5] Nervorum Descriptio et usus. Geneva, 1695.

[6] Neurograph Univers, lib. 3 de Nervis, cap. v.

[7] De Ganglia Nervorum.

[8] Mémoires de Berlin, 1749.

[9] Ibid., 1753.

[10] Annal. Anatom. de Gangliis.

[11] Anatomie générale.

Riel,[1] this system of nerves has, since their day, become to be studied more in reference to the acts of nutrition and secretion, than in any other relation. Bichat named it the nerve of organic life, and Riel, having imbibed the idea from him, attributed to it the same function.

Upon this view, gradually advancing, observation after observation has been made, and experiment upon experiment performed, until Bichat's and Reil's theories, in regard to its use, have been in most part verified, and, at the present day, there is scarcely any portion of the organism about whose function opinion is better established, than that the formerly called sympathetic nerve, or ganglionic system, is the system presiding over nutrition. Inasmuch as it is by *secretion*, or some act analogous to it, that all the processes of nutrition are accomplished, it has gradually gained the appropriate name of the *Secretory System* of nerves. It is of this secretory system of nerves, and more particularly in its connection with the nerves of Relation—the cerebro-spinal—that we have to treat in the present discussion.

In the investigation of this very important subject, we shall, to a certain extent, present an analysis of those observations and experiments, accumulated from an early period to the present time, which appear to us to have a particular bearing upon our subject, in order that we may deduce from this analysis, if possible, a fuller development than has been heretofore done, of the excito-secretory system of nerves.

Experiment, without correct analysis, is ever inadequate and unproductive. Adopting for our motto the significant sentiment of M. Victor Cousin, that "observation becomes experiment when used in severe processes of induction," we claim for our generalization of heretofore unapplied results, an importance equal to that of actual experiment itself. We would not, however, appear to depreciate the value of experimental research; so far from this, we congratulate ourself upon the valuable body of facts, developed by this means during the last and the present century, and which now are accessible to every one who will enter the laborious field of inductive reasoning. In our humble opinion, the facts already accumulated are abundant, link after link has been fashioned, and nothing remains for the physiologist but to weld them together,

[1] Archiv. fur die Physiologie.

and to construct them into a chain of evidence by pertinent and impartial generalization.

As will be readily observed, by a reference to all late works on the subject, these two systems of nerves, viz., the cerebro-spinal and the secretory, are ever found in the most intimate relation with each other. While we do not conceive that it is here necessary to enter minutely into the anatomy of the two systems, we deem it advisable to refer briefly to some of the more important connections subsisting between them, in order to illustrate our doctrine of the excito-secretory function, resulting directly from a consideration of these connections.

SECRETORY SYSTEM OF NERVES.

The sympathetic, or secretory system of nerves, consisting of a chain of ganglia, extended, it is thought by some,[1] from the anterior communicating artery of the brain to the ganglion impar, at the lower portion of the spinal column, is found everywhere in intimate relation with the vascular system, and particularly with the arteries. It is evidently the nerve of the bloodvessels, and the branches follow and ramify upon their coats, clinging to and encircling them "as the ivy entwines itself around the oak." Wherever there is a secretory surface, or a gland, which is only a complex secretory surface,[2] wherever the metamorphosis of blood is going on, or the elimination of a secretion is being performed, there we find distributed, in greater or less profusion, the *branches* of the ganglionic system; while in convenient collocation to every secretory apparatus, we find also one or more of the ganglionic centres of this system, apparently designed to superintend and direct, and to supply nervous force for the mysterious operation. In direct proportion, too, to the activity of the nutrient or secretory process, do we find these centres of peculiar energy, allotted to any particular portion of the organism, and, wonderful to consider, even do the temporary and arbitrary circumstances of an organ seem to control and measure the amount of actual nerve-substance which that organ, or system of organs, shall, for the time being, have to direct and superintend its nutrition. The well established and generally admitted

[1] Ribes.

[2] Vide Carpenter's Physiology. Owens' Lects. Compar. Anat., and Grant's Outlines Comp. Anat.

researches of Dr. Robert Lee, together with the pertinent analogies found in the other tissues of the uterine system, as the rapid increase in all the tissues of the uterus, have placed this last fact beyond all reasonable doubt. Indeed, if we admit that the ganglionic system is the vis incita to nutrition, and this we must admit; if we recognize any relation between the amount of nerve-substance devoted to any part, and the energy of nervous action in that part, and this we must recognize, there can be no escape from the induction that the ganglia discovered by Dr. Lee are *necessary* to the increased action going on in the organs of generation during the period of gestation, even though they had *never* been discovered. Dr. Lee is but the pioneer probably in this field of research, and we would here almost venture the opinion, that time must develop similar growths in the ganglia lying adjacent to *morbid* epigenetic tissues in *every* part of the organism.

It would be an improving and not unpleasing exercise to enter into an extended review of the history of the various experiments by which the fact has been demonstrated, that the ganglionic system is truly the secretory system of nerves, but time and the special object of this essay will not admit of such discursive views; we wish to evolve, as briefly as possible, the excito-secretory system, and will, therefore, consider only those points in its history which are available for that special purpose. As early as the year 1732, Pourfour du Petit found that the division of the trunk of the sympathetic nerve, opposite the fourth or fifth cervical vertebra in dogs, was very rapidly followed by great disturbance in the circulation of the eyeball, producing inflammation, flattening of the cornea, retraction of the eyeball, with protrusion of a fold of the conjunctiva, *and a flow of tears*, and ultimately ulceration and destruction of the entire organ.

The experiments of Dupuy[1] upon horses, wherein he extirpated the superior cervical ganglion, were followed by the same *local* results, with regard to the eye, and also by the singular, *general* effect of producing an *eruption over the whole cutaneous surface*, which was succeeded by general emaciation and an *œdematous state of the limbs*. Some of Arneman's experiments on the nerves,[2] confirm the above results, for in them, as reported, we find that the effect upon the eye *was to produce an ecchymosed and bloodshotten*

[1] Journal de Médecine Chirurgie, &c., Decembre, 1816, tome xxxii. p. 340.
[2] Gottingen, 1787.

appearance. Dr. John Reid,[1] who also experimented in this field, cutting and irritating the sympathetic nerve in the neck, leaves a similar record, viz: that the conjunctiva became *red and congested* in a *few minutes* after the operation. In the experiments reported by Molinelli,[2] Cruickshank,[3] Mayer, of Bonn,[4] and Brachet,[5] the unvarying effect of ligation or section of the sympathetic in the neck, has been to affect, or in some manner modify the circulation of the blood in the vessels of the conjunctiva and other parts of the eye, while on the other hand, those experiments reported by Flourens[6] and others, wherein the *cerebro-spinal* nerves and centres have been destroyed, go far to show that the circulation is independent to a great degree of this latter system.

All of the above relate to experimental physiology, and such facts have been accumulating for more than a hundred years; but there is another department which should be ever considered of equal value, if not more important, in which facts accumulate and are occasionally recorded, which possess the most significant and pertinent bearing upon the physiology of the nervous system. It is scarcely necessary to say, that we refer to the observation and record of *pathological* phenomena. It has ever appeared to us, that one great cause of the slow and uncertain progress of physiological science, has rested in the fact, that physiologists have not been generally, either bedside or autopsic observers, but mainly experimenters—thus being cut off from the observation and discussion of some of the most significant phenomena of the nervous system. With diligent and intelligent observation, proper generalization and impartial induction, the clinical and autopsical facts would be found, often, to supersede the most troublesome and unreliable experiments, and, in the end, could be made to yield a far richer and more abundant treasure of results. Unfortunately, from the causes mentioned above, viz: that practitioners of medicine are not often critical physiological observers, we find but few of these valuable facts on record, from which to evolve results in our present investigation. There are, however, a few, and among this few, some are

[1] Edinburgh Medical and Surgical Journal, August, 1839.

[2] Comment Banoniensi, tom. iii. 1755.

[3] Medical Facts and Observations, Philosoph. Transactions, 1795.

[4] Journal der Chirurgie, 1827.

[5] Recherches Expérimentales sur les Fonctions du Système Nerveux Ganglionaire.

[6] Système Nerveux, 1849, p. 214.

of the most significant character. It will be observed, that in most of the experiments performed on the ganglionic system, the ganglia in the cervical region have been selected, and this is generally stated to be on account of their greater accessibility; the abdominal ganglia have been only in a few instances[1] experimented on, and these experiments, on account of the important and sensitive parts cut through to reach the nervous centre operated on, were followed by the most unsatisfactory and unreliable results.

In the experimental investigation of physiological problems, the mode of procedure is first to make the experiment; for instance, uncover a nervous centre, apply an irritant, or make a section of it or of its afferent or efferent nerves, and note the effect produced upon the parts of their distribution; in the investigation of these problems, by pathological observation, the course is reversed; a certain set of inexplicable phenomena arrest the attention—the *effect*, so to speak, is first noted, and afterwards, the cause is investigated, and the connection between cause and observed effect thus traced, and the physiological principle satisfactorily evolved. Which, we would ask, in these two processes, is better entitled to be called the experiment? It is our humble opinion that neither has the advantage, but that the "*observation*," under these circumstances, "becomes experiment," and is fully as useful in the induction as any artificial experiment could possibly be, and that it will *yield* as much.

Of the above class, will be found the following pertinent facts recorded by various authors, but never dwelt upon and allowed that amount of significance in a pathologico-physiological point of view which we think they deserve.

"In a case of *diabetes*, in which the urinary bladder was very much dilated," says Lobstien,[2] "Dr. A. Duncan[3] observed, that the sympathetic nerve was three or four times larger than usual, from its ingress into the abdomen to its termination in the pelvis." Here seems to be a relation between the excessive secretion of the kidney and the increased size of the secretory nerve, which strongly corroborates the attributed function of that nerve.

Lobstien detected an *enlargement of the nerves of the right semilunar ganglion* in an unmarried woman, 25 years of age; she had been affected with a *chronic miliary eruption* previous to her death.

[1] Flourens, op. cit., p. 232. Semilunar ganglion.

[2] Structure and Functions of Sympathetic Nerve.

[3] Reports of the Practice of the Clinical Wards of the Royal Infirmary of Edinburgh, 1807 to 1818.

"It has been proved," says Lobstien, "by observations undertaken for that purpose, that the nerves may not only be increased in thickness, but in number likewise." 1. "I dissected," he continues, "a case of hydro-sarcocele in the spermatic cord, in which I detected many nervous filaments, though evidently belonging to the sanguineous vessels, of which one extended to the vas deferens. I convinced myself in each case, with the microscope, that I had not mistaken the lymphatic vessels for nervous filaments. In a thyroid gland of remarkable size, weighing four pounds, which had been converted into innumerable cysts, abounding with limpid gelatinous humor, I discovered a *great many nerves.* Three nervous trunks, which proceeded from the laryngeal nerve and upper cervical ganglion, entered the gland on each side in company with the superior thyroid arteries. Each arterial branch had an attendant nervous filament, not connected immediately with the tunics of the vessels, but adhering to them by the aid of cellular membrane. But all these nervous branches which were linked together by anastomotic filaments, formed a beautiful plexus; they were united with the nerves of the opposite side, and thus formed a kind of crown around the superior part of the gland. From this crown branchlets descended upon the external face of the gland, one of which was joined by anastomosis with an ascending filament from the recurrent branch of the par vagum. Nevertheless, all these thyroideal nerves, which formed a network about the arteries at the upper margin of the gland, that excited my admiration, presented nothing unusual in their structure or appearance."

We would here ask, if anything could be more corroborative than this pathological observation of Dr. Robert Lee's dissections and observations of the nerves of the gravid uterus, and also of our own remark, made a few pages back, that the time will probably arrive when for every morbid growth *there will be discovered an increase in the actual nerve-substance* in the adjacent parts of the *secretory system connected with such growth.*

"But," continues Lobstien, "the *contrary* of this phenomenon is observed in other instances; to wit, where the number of nerves is greatly diminished. I found a kidney entirely destroyed by suppuration, with the exception of a coriaceo-lardaceous capsule, which still existed and was full of pus. The pelvis was distended with matter as well as the ureter, the parietes of which were very thick and hard. There were also observed some indurated and apparently scirrhous adeps upon the surface of the same kidney, which

is frequently found in other organic diseases, and especially in tha produced by chronic inflammation. The *renal plexus* was compos of *only five branches*, which were very little connected together. It exhibited a ganglion half a line broad. When the kidney with its nerves was dried, an oily fluid was exuded from the nerve branches; but the nerves of the other kidney, which was healt when dried in a similar way, did not exhibit this phenomenon."

A girl of ten years of age suffered from paralysis of the lowe extremities for some time, but for three months previous to he death, she labored under the most incurable diarrhœa with tormina On making a post-mortem examination, there was found a larg abscess on the left side, extending from the sixth to the tenth dorsa vertebra. On opening this abscess, the trunk of the left sympathetic nerve was found *destroyed entirely* from the sixth to the twelfth vertebra, and the lumbar portion of the same nerve was in a stat of inflammation.[1] Dr. Aronsshon, of the Strasburg Hospital, reports two cases; the first, that of a man, forty-seven years old, affected with diarrhœa. He died with a tumor in the abdomen, for which he was examined, and it was found that the *semilunar ganglia* were *affected with distinct inflammation*. The other case was that of a woman, aged about thirty years, who in her second pregnancy was subjected to vomiting throughout the whole gestation. She was also affected with a *furfuraceous eruption upon the breast and arms*, with *swelling of the limbs* and with *diarrhœa*. On post-mortem examination, the semilunar ganglia were found in a state of genuine inflammation.

We have quoted the above records with the view of illustrating the varied effects resulting from injury to the ganglionic system and its branches. In them we have seen that such injury, either produced in experiment or in the progress of diseased action, has been invariably to modify the circulation and the secretion of the parts to which its branches were distributed; thus, firstly, in the various experimental sections by Arneman, Pourfour du Petit, Dupuy, and Reid, the eye, and the various appendages upon which the branches were distributed, became *ecchymosed* and *bloodshotten*, and the secretion modified, while, in most instances, the organ was finally entirely destroyed. Secondly, in the cases reported by Lobstien, we find that a case of *diabetes* was accompanied with an extraordinary development (four times their usual size) of the secre-

[1] Op. citat., p. 147.

ory nerves supplying the kidney; that, in another case, injury to branches of this system was found to be accompanied with diarrhœa, while, in several, cutaneous eruptions and œdematous states of the body were also concomitants of such injuries; whether experimentally produced, or from disease in the centres themselves.

The above facts, together with many others recorded since, and which are every day being brought to light by the indefatigable labors of experimental physiologists, we think place the function of the ganglionic system beyond all doubt; but there is one other series of experiments to which we desire to refer before entering into the discussion of the excito-secretory system, because in them, although they were not made for this purpose, we think we find even a better illustration of the secretory function of the ganglionic system than in any of those heretofore adduced. We refer to the experiments of M. Magendie to develop the function of the *fifth pair* of nerves. We find these experiments quoted by Dr. Alcock in the *Cyclopædia of Anatomy and Physiology*,[1] and as there reported and commented upon by Dr. Alcock, we find in them a demonstration of the fact, that an author's results and his records are sometimes less useful to himself in arriving at the truth than when made subservient to that end, in the deductions of another, who may approach them without having been committed to any foregone conclusion.

The present treatise by Dr. Alcock on the anatomy and functions of the fifth pair of nerves, we regard as the best and most reliable embodiment of the science upon the subject, and while we have reason to dissent from some of the author's views in his strictures upon M. Magendie's conclusions upon the significance of his experiments, we cannot commend the paper too highly for the clear and accurate views put forth by him, both in regard to the anatomy and the physiology of this important part of the nervous system.

The discussion of the vital properties of the fifth pair of nerves, this writer arranges under the four following heads: "1. Its sensibility. 2. Its influence upon the faculties of sensation and volition, as also upon the ordinary sensibility of the parts to which it is distributed; and 3. Its relation to the special senses, and *its connection with the function of nutrition.*"

With the two first divisions of the subject we at present have but little to do. It appears that the sensibility of the fifth pair was first

[1] Dr. Robert Bentley Todd. London.

experimentally and definitely demonstrated by Sir Charles Bell, and that he directed attention to this point, first, in a paper published in the *Philosophical Transactions* for the year 1821. The nerve, when exposed in an ass, "gave acute pain."[1] His observations were soon succeeded by those of Herbert Mayo,[2] who also experimented upon the ass, pinching the cerebral extremity of the trunk of the nerve, and producing the same result as in Bell's experiment. Magendie repeated these experiments, and by his and a multitude of similar experiments and observations from that time to the present, the physiology of the nerve in its relation to sensibility, has been fully established.

In relation to the second head, it is only necessary to note, that the restriction of the voluntary motor influence to the non-ganglionic portion of the fifth pair, was first announced by Herbert Mayo, and since then the question has been considered as entirely settled by most physiologists.

But it is more particularly in the relation of the fifth nerve to the processes of nutrition, that we are at present interested; and it is to this portion of Dr. Alcock's last division of the subject that we wish now to refer.

"The last question proposed to be considered with reference to the functions of the fifth nerve is in connection with *nutrition*.

"The opinion that this nerve controls the nutrition of the parts which it supplies, has been advocated by Magendie more particularly with regard to the eye. It has been already stated that we are indebted to this writer for information in regard to results of the division of the entire trunk of the nerve, within the cranium. Of these, the most prominent is the entire loss of sensibility on the same side of the face, and in regard to the eye especially, loss of sensibility in the conjunctiva, upon which the most irritating chemical agents, then, produce no impression. These immediate effects of the section were followed by others not less remarkable; on the next day, the sound eye was found inflamed by the ammonia which had been applied to it, while the other presented no trace of inflammation. *Other changes, however, supervene.* The cornea of the eye of the side on which the section is made, twenty-four hours afterwards begins to *become opaque;* after seventy-two hours, it is much more so, and five or six days after, it is as white as alabaster. On

[1] Cyclopedia of Anatomy and Physiology.

[2] Physiological Commentaries, No. 1, p. 110. 1822.

the second day, the conjunctiva becomes red, inflames, and secretes a puriform matter. About the second day, the iris also becomes red and inflames, and false membranes are formed upon its surface. *Finally, the cornea ulcerates, the humors of the eye escape, and the globe contracts into a small tubercle.* In endeavoring to ascertain the cause of these changes," continues Dr. Alcock, "Magendie, on the supposition that they might be owing either to the continued exposure of the eye to the air, or to the want of the lachrymal secretion, divided the portio dura in one rabbit, the effect of which is to destroy the power of closing the eyelids; and from others he cut out the lachrymal gland; but in neither case did opacity of the cornea succeed. The sequence of the effects mentioned after the section of the nerve, might naturally lead us to infer that the loss of nervous influence gives rise to them. But such is not the inference drawn by Magendie, *nor indeed can it be admitted!* Absence or subtraction of an influence cannot be directly the cause of an alteration in the condition of an object otherwise than by allowing it to come or return to a state from which it is preserved by the presence of the influence, and there is no good reason, either theoretical or experimental, for believing that the state induced in the case under consideration is one in which the eye would necessarily be—which, in fact, would be natural to the organ but for the restraining influence exerted through the fifth nerve." And a little further on Dr. Alcock remarks: "But indeed there does not appear any reason for admitting that the alterations which took place in the condition of the eye were produced directly by the loss of nervous influence. Having, as he conceived, disproved, by the experiments related, the idea that the alterations were owing to the continued exposure of the eye to the air, or to the want of the lachrymal secretion—the only other causes which appear to have occurred to him—Magendie arrived at a conclusion the opposite of that just mentioned, and adopted the opinion that the phenomena 'depend upon an influence purely nervous,'[1] exerted by the *fifth nerve* upon the eye—'*an influence independent of the connection of the nerve with the spinal marrow*'[2]—*an influence proper to the nerve, which has not its source in the cerebro-spinal system,* and *which is even the more energetic the further we remove from that system to a certain distance,* of which the following is his proof: 'Alterations of nutrition in the eye are the less com-

[1] Anatomie des Systèmes Nerveux, &c., t. xi. p. 716.

[2] Journal de Physiologie, p. 304.

plete, the less rapid, *as we remove further from the point of branchia;* of the nerves of the fifth pair, and as we cut within the cranium the fasciculus of origin the nearer to its insertion; finally, the section of the nerve on the margin of the fourth ventricle no longer produces any alteration in the state of the eye."[1] On this view, there are plainly two positions advanced, viz: that the nerve does itself exert a proper and independent influence upon the nutrition of the eye, and that it is the section of the nerve which causes the exercise of that influence, or, to use his own words, which is the cause of the inflammation, &c. That the occurrence of the alterations in the eye, in the case in question, is not due to an influence exerted by the brain through the nerve, and that it must proceed from another cause, and that not dependent upon the connection between them, is manifest, since it is consequent upon the interruption of that connection; and therefore, if the nerve do possess the supposed influence, *it must be a proper and independent one;* but are we therefore to infer that the nerve does exert such an influence upon the organ? It appears to the writer (Alcock) that we cannot; for can we suppose that the nerve is endowed with a property to be displayed expressly under circumstances which, it is fair to say, were not contemplated in the establishment of natural laws, viz., in cases of mutilation?—or, *is it possible that a separate influence can exist in the nerve*, and increase in energy in proportion as the nerve is curtailed? for, the *nearer the section is made to the eye*, the more remarkable are the effects.[2] Or if any other proof that the nerve does not possess such an influence be wanting, can we suppose that it is possessed for the eye and not for the other parts to which the branches of the nerve are distributed? Why does not the inflammation forthwith assail the nostrils, the mouth, and cheeks, upon the mere section of the nerve as well as the eye?[3] Manifestly *because no such influence exists;* and indeed the data upon which it has been assumed, instead of proving the position, leave it precisely as it was; for inasmuch as the occurrence of the phenomena upon the section proves the existence of the influence of the nerve, in the same degree does the absence of the phenomena upon the section of

[1] Op. cit., *ibid.*

[2] Dr. Alcock appears to think that the *ratio ad absurdum* is applicable here, but we hope to show that Magendie, though not understanding *whence* the influence is derived, is nearer right than he is.

[3] It does, to a certain extent, as shown by his own quotation from Magendie and Dr. Alison.

the nerve" (we must here recollect that this second section is further back, nearer the medulla oblongata) "disprove it."

"But *was* the inflammation caused by the section of the nerve? This question, which certainly ought to have been determined satisfactorily before a theory had been founded upon the assumption, appears to the writer to have been decided too hastily in the affirmative. If the section was the cause, no sufficient reason can be assigned(?) why it should occasion inflammation in one part to which the nerve is distributed, and not in another—yet such is the case; the eye is the only part in which inflammation supervenes, either so uniformly or so quickly as to afford any ground for attributing the process to the section. In the second place, were the section the real and essential cause, it cannot be supposed either on the one hand that the non-essential circumstances could influence, or at all events, prevent the effect, or on the other that they could produce it. Now it will presently appear that both the one and the other may take place; and a comparison of Magendie's experiments and their results will alone suffice to show, that the real cause is to be sought elsewhere than in the section of the nerve. Magendie divided the nerve in three different situations; first, through the temporal fossa; secondly, within the cranium, between the Casserian ganglion and the pons Varolii; and thirdly, at the margin of the fourth ventricle; and his own general account of the results, which has been already cited, is as follows: 'Those alterations in the nutrition of the eye are the *less complete, the less rapid*, as we *recede more from the point of branching* of the nerves of the fifth pair; and as we cut within the cranium, the fasciculus of origin the *nearer* to its insertion; finally, the section on the margin of the fourth ventricle no longer produces any alteration.' It is plain then that the nerve may be cut, and the changes in the eye ensue or not, according to circumstances to be yet explained. On the other hand, that effects similar in kind, if not equal in degree, may be produced by circumstances not essential to their production—according to the doctrine maintained, but incidentally associated with the supposed cause—that such effects may be produced by such circumstances when dissociated from the other and operating separately, the author (Alcock) feels justified in asserting from the result of some experiments lately made by himself, which lead to the conclusion that similar effects may be produced without the section of the nerve at all, and that an injury in the vicinity of the

orbit may excite them, though neither the trunk of the fifth itself, nor its ophthalmic division, has been divided. In endeavoring to determine the nerves of taste, he undertook the removal of the *ganglion of Meckel* from the dog. In order to accomplish this, it was necessary to displace the zygoma and the coronoid process of the jaw; he attempted it several times before he succeeded, and failed at different stages of the operation; but in almost every instance the *eye* of the *same side* became *bleared within the next two days*. The animal kept it nearly closed, a whitish puriform matter was discharged from it, in quantity proportioned to the case, which concreted between the lids, and the animal made no attempt to remove the matter or cleanse the eye; the affection of the eye was always proportioned to the violence done, and abated with the inflammation of the wound, *and in one of the instances in which the ganglion was removed, it actually produced opacity of the cornea, and ulceration in that structure*, which continued after the lapse of more than a month from the operation; yet most assuredly neither infra-orbital nor ophthalmic nerves had been divided. Thus if, on the one hand, the nerve" (meaning the fifth) "may be cut and the changes not ensue, on the other, it may be left uncut, and yet the changes may occur ..... From the preceding considerations it appears to the author necessary to infer, that the changes which supervene in the eye after the section of the fifth nerve in certain cases, *take place independently of the section* as the primary, immediate, or proper cause; for were it otherwise, it cannot be supposed either that the difference of half an inch to one side or the other, as regards the point of section, could so influence the cause as to prevent or allow these changes, or that they could occur, even in degree, without it.

"How, then," continues our author, "are the phenomena to be explained? It has been said by Magendie that they are less marked the more we recede from the point of branching of the nerve; but it is to be further observed, that as we recede from the point of branching of the nerve, we recede also from the orbit, the eye, and its appendages, and in our operation for the division of the nerve, we do less violence either in their vicinity or actually to them, until the operation is performed at such a distance from those parts that they are not involved in the injury inflicted.....

"It would seem, then, that the *great violence* inflicted either in the vicinity of the eye, or actually to its appendages, constitutes the

primary and immediate cause of the alterations which took place in the eye in the experiments under consideration."[1]

We have quoted thus extensively from Dr. Alcock's paper, not merely because we think we see the interpretation of the phenomena which neither himself nor Magendie seems to have suspected, but more particularly because his account of these experiments, and also his reasoning upon them, appear to our mind to embody all the phenomena necessary to develop very fully the secretory function of the ganglionic system of nerves, and also to illustrate the *connections* between that system, as it exists in the eye and its appendages, and the cerebro-spinal system, in a most pertinent and striking manner. The very difficulties which he proposes, and the mystery with which he and Magendie both seem to invest the phenomena—the one attributing an inherent, independent power to the fifth pair, while the other denies its existence, only serve to bring the question under consideration more fully into a form of proposition approaching to that which logicians technically term the dilemma, and render it more apt for a ready and satisfactory solution.

Let us review, briefly, a few of the results of these experiments on the fifth nerve, and also some of the deductions of Magendie, with those of Dr. Alcock, in regard to them. With the results relating to the sensibility or motor power in the parts, we have nothing to do, but in those results which concern the alteration in the tissues of the organs to which the branches of the fifth are distributed, we are deeply interested.

It will be observed, then, that besides the loss of sensation, &c., "*other* changes supervene. The cornea of the eye of the side on which the section is made, twenty-four hours afterwards, begins to become opaque; after seventy-two hours, it is much more so, and in five or six days, it is as white as alabaster. On the second day, the conjunctiva becomes red, inflames and secretes a puriform matter.... Finally, the cornea ulcerates, and the humors of the eye escape, and the globe contracts into a small tubercle."

Mons. Magendie, in reasoning upon these phenomena, is careful to state, that these effects are not due to the *arrest* of the *lachrymal secretion, which also is one of the common results of the section*, or to the continued exposure of the eye to the air, and he further confirms

[1] Cyclopedia of Anatomy and Physiology, by R. B. Todd, M. D.; article, Fifth Pair of Nerves, p. 312; R. Alcock, contributor.

the justice of his opinion by two independent experiments—first, the removal of the gland without these results, and secondly, a section of the seventh pair. He thus, apparently, fairly comes to the conclusion, that the section made upon the trunk and branches of the fifth pair is the *cause* of the changes in the tissues, and in the secretions of the eyeball; and becomes settled in the conviction, that in this nerve resides the controlling influence of the circulation of this organ. But upon making his sections further back, that is, nearer to the origin of the nerve at the fourth ventricle, although more of the nerve is cut off, or "curtailed," still the amount of the effect is diminished; he therefore comes to the conclusion, that this power, which, to his mind, undoubtedly exists in the fifth nerve, must be independent of the spinal marrow and the brain, that it must be an "*inherent power*" in the fifth nerve itself. His reviewer, Dr. Alcock, denies this theory, and accounts for the diminution in the results on receding from the eye, on the theory that as he receded from the eye, just so much was the mechanical local injury removed from the vicinity of that delicate organ, and hence the result would not be *expected* to be so marked. The explanation of these apparently mysterious results, and the conciliation of these very opposite opinions, we think are to be found in a more extended view of the subject, and in a comparison of the results of Magendie's experiments with the known results of certain other experiments made years previous, not with any view, however, to develop the functions of the fifth pair of nerves.

From the mere fact that they have been brought within a few pages' proximity to each other, the reader has doubtless been struck, ere this, with the remarkable similarity—indeed, identity—of the results subsisting between this series of experiments by Magendie, to determine the function of the fifth pair of cerebro-spinal nerves, and those performed nearly one hundred years before by Pourfour du Petit,[1] on the dog, to determine the function of the branches of the sympathetic nerve, again by Arneman,[2] and later by Dupuy,[3] upon the horse, and still later by Dr. John Reid,[4] on the dog, the cat, and the rabbit; all followed by the same uniform results, viz, congestion of the eye, opacity of the cornea, aberration in secretion, purulent discharge, ulceration, discharge of the contents of the globe, and generally, final destruction of the entire organ. Could

[1] Loc. cit., 1732.
[2] Loc. cit., 1789.
[3] Loc. cit., 1816.
[4] Loc. cit., 1839.

we ask a closer identity of results? When we scan Dr. Alcock's arguments against Magendie's theory a little closer, and analyze his own experiments, which he adduces to prove that Magendie has caused his results by the "*mechanical violence inflicted*," we find a still stronger corroboration of the opinion that all the results of Magendie's experiments which relate to nutrition and secretion, were of the same character and from the same source as those produced in the older series by Pourfour du Petit, Arneman, Dupuy, Reid, Molinelli, and others. "The author" (referring to himself) "feels *justified* in asserting, &c., from the result of some experiments lately made by himself, which lead to the conclusion that similar effects may be produced without the section of the nerve (fifth pair) at all, and that an injury in the vicinity of the orbit may excite them, though neither the trunk of the fifth itself, nor its ophthalmic division, has been divided. In endeavoring to determine the nerves of taste, *he undertook to remove the ganglion of Meckel from the dog*." He failed in some of these operations, and in others succeeded, "*and in almost every instance, the eye of the same side became bleared within the next two days*." A whitish puriform matter was discharged from the eye; "*and in one of the instances in which the ganglion was removed, it actually produced opacity of the cornea and ulceration in that structure*. . . . Yet, most assuredly, neither the infra-orbital nor ophthalmic nerves had been divided." In this last remark, we see plainly whence these changes can arise; this Meckel's ganglion, so incidentally and apparently unsuspectingly mentioned, is a ganglion of the sympathetic or secretory system of nerves—a centre of that controlling influence which we have seen presides over, directs, and superintends the nutrition and secretion in every vascular organ of the body—a centre, similar in its endowments and inherent peculiarities to the cervical ganglion experimented on by Pourfour du Petit, nearly a century before, with identical results. If there ever is any doubt remaining in relation to the ganglionic character of this spheno-palatine body (some have said it was only a mass of fat), that doubt must be at rest forever, for while Dr. Alcock's experiment has failed to controvert the statement of Magendie, that the fifth nerve possessed some inherent element for controlling the nutrition of the parts to which it is distributed, and rather establishes the reverse, it proves most satisfactorily that Meckel's ganglion is, *indeed*, a ganglion of the secretory system of nerves. It further proves that its branches, though not apparently distributed directly to the eye, are very important to the processes of nutrition

going on in that organ. But, it may be asked, if these aberrations of nutrition and secretion following the section of the fifth nerve at *certain points*, did not accrue from the mechanical violence done to the parts; if, as it appears, the escape from these results did not come from a connection being maintained with the medulla spinalis, how can the phenomena be explained without the admission of the theory advanced by Magendie, viz., that "a separate influence may exist in the fifth nerve, increasing in energy in proportion as the nerve is curtailed?" This brings us naturally to an important portion of our subject, viz., the consideration of the relations and connections subsisting between the trifacial of the cerebro-spinal and the ganglionic or secretory system of nerves, for it is in this region that we expect to illustrate more particularly some of the more striking features of that somewhat recently described function which results from these connections and relations—the excito-secretory.

That the fifth pair of nerves should be endowed with "a separate influence, increasing in energy in proportion as the nerve is curtailed," would, indeed, appear to any one, as it does to Dr. Alcock, a preposterous and paradoxical proposition, unworthy of any attempt at serious refutation; and, hence, he gives to it a simple but decided denial, and seeks the explanation of the phenomena elsewhere, viz., in the violence done to the parts concerned in the performance of the experiments. But to our mind, keeping constantly in view the whole train of phenomena here presented, and still giving due weight to the significance of the results of other experiments, performed years before to determine the function of a totally different portion of the nervous system (the sympathetic or secretory), the theory of Magendie is perfectly acceptable when he refers to "an influence residing in the nerve, and that it increases as the nerve is curtailed." The proposition is only preposterous when we fail to apply the key to their explanation, which key is impartial and unbiased observation and generalization.

The fifth pair, trifacial, or trigeminal nerves, is a pair of nerves of the cerebro-spinal system, arising, according to the most reliable authorities, from the medulla oblongata, near the region of the fourth ventricle. In its distribution, it is found displayed principally upon parts endowed with sensation, as the cutaneous surfaces of the face, side of the head, the eye, &c. &c., but in addition to these parts, we find that branches are sent to the tongue, lachrymal gland, mucous membrane of the nose, &c. And, also, that a portion of this trifacial nerve supplies branches to certain muscles

of the jaw, viz: the pterygoid, buccinator, masseter, and temporal. With these muscular or motor branches, we are not concerned in the present investigation, nor, indeed, with the many theories promulged by authors attributing various endowments of special sensation, as of hearing, olfaction,[1] vision,[2] &c., to the sensitive portion of the nerve, our interest being principally in its endowment of ordinary sensation, and the alleged control which it exerts over the nutrition of the parts to which it is distributed. In considering more closely the three divisions of the fifth pair of nerves, we find that the upper division, or ophthalmic nerve is given off from the superior part of the Casserian ganglion, and as a short trunk proceeds towards the orbit, where it divides into three branches; the frontal, the lachrymal, and the nasal. The frontal branch goes to the cutaneous surfaces about the forehead and eyelid, &c., and by experiment and observation, is found to endow these parts with ordinary sensation; but the two remaining branches, viz: the lachrymal and the nasal, are principally distributed upon parts and surfaces, which, while they possess the common attribute of ordinary sensation, yet also perform acts calling for endowments not to be supplied from the resources of the cerebro-spinal system at all—endowments which are only found to be conveyed to any part by the distribution of *ganglionic* filaments in that part—we refer to the lachrymal gland, the conjunctiva and mucous membrane of the nose, all secretory surfaces,[3] to which these two latter branches of the ophthalmic are distributed. The secretory element, then, being necessary in the parts to which these branches are sent, in order that they may perform their proper function of secretion, we find placed in convenient juxtaposition with them a ganglionic centre of the secretory system, viz: the lenticular, or ciliary ganglion, which sends what is called its long root, to the nasal nerve, and thus supplies it with the secretory element. The lachrymal branch receives its secretory filaments from the carotid plexus through the several branches sent to the ophthalmic nerve previous to its division.[4]

The above arrangement we see carried out with regard to the

[1] Scarpa. De Auditu et Olfactu.

[2] Zinn. De differentia fabricæ oculi humani et brutorum.

[3] A gland is but a complex secretory surface. See Grant's Outlines of Comparative Anatomy, Owen's Lectures on Comparative Anatomy, and Carpenter's Comparative Physiology.

[4] Anatomist's Vade Mecum. Erasmus Wilson, p. 485.

other divisions of the trifacial nerve; thus, in the case of the superior maxillary, inasmuch as certain filaments from this division are to be distributed to secretory surfaces, as the buccal mucous membrane, the mucous membrane of the antrum, the mucous membrane of the floor of the nares and the palate,[1] we find that ere it proceeds to these parts, and even before giving off any of these filaments of distribution, it has incorporated with it, two very stout trunks from the ganglion previously mentioned, viz: Meckel's ganglion, or the spheno-palatine ganglion, and that afterwards the naso-palatine, or Cloquet's ganglion, affords it another supply for the secretory exigencies of the anterior portion of the mouth and lips. Then, again, when we come to consider the last great division of the trifacial, viz: the inferior maxillary nerve, we find, to a certain extent, the same character of distribution, consequently the same need for the secretory element, and just as certainly, the same collocation of a ganglionic centre, and the abundant supply therefrom of the required secretory influence.

We refer now particularly to its sensitive or internal trunk. This we find dividing into three branches, the gustatory, the inferior dental, and the anterior auricular, which are distributed to the teeth of the lower jaw and other sensitive parts, but also to several parts which are not only sensitive, but secretory as well; thus we find these various branches supply the tonsils, the mucous membrane of the fauces, the submaxillary gland and duct of Wharton, and the sublingual gland, while certain branches go to the meatus auditorius and the tympanum. Here the submaxillary ganglion serves as the magazine of supply, and that is reinforced probably by the considerable tributary filament, the chorda tympani, which runs along in the sheath of the gustatory, to join that ganglion at the submaxillary gland. The auricular nerve which supplies, in part, the mucous secretory surface of the internal meatus and the tympanum, is fitted for the secretory office by the branches it re-

[1] "Previously to their distribution, the dental nerves form a *plexus*" (this looks very much like they contained ganglionic filaments, the *peculiar trait* of which is to form *plexuses*), "the superior maxillary plexus, in the outer wall of the superior maxillary bone immediately above the alveolus. From this plexus, the filaments are given off which supply the pulps of the teeth, the gums, the mucous membrane of the floor of the nares, and the palate. Some *gangliform masses* have been described in connection with the plexus, one being over the canine, and another over the second molar tooth."—*Anatomist's Vade Mecum.* Erasmus Wilson, p. 442.

receives[1] from the otic ganglion situated near the inner surface of the inferior maxillary nerve, immediately below the foramen ovale. The last, but at the same time the most important region in this connection, which we will refer to before attempting to explain the results of Mons. Magendie's experiments, is the interior of the globe of the eye itself. This portion of the being is, to all intents and purposes, an organism of itself, cut off and excluded from all channels of communication with the nervous centres, except those which enter its interior by the nerves which perforate the sclerotic coat. Yet its endowments are varied and complex; general sensation, special sensation, and muscular motion, with an exquisitely adjusted excito-motory correlation, as evinced by the contractions and dilatations of the pupil. In order to maintain these several functions, there are sent to this organism nerves severally endowed with each of the above functions. Thus for the special sense, of which it is the organ, we find the optic nerve; for ordinary sensation and for motion, and its excito-motory phenomena, branches of the fifth pair, and also branches of the third pair proceed towards its posterior wall, and finally enter it, conveying to the organ all those powers, both primary and subsidiary, necessary for the exercise of its peculiar function, vision. But the eye, besides being a delicately arranged apparatus of vision, is also a portion of a living organism—to a certain extent, as we have before said, a separate living organism itself, and besides æsthetic and motory endowments, it further requires to be maintained as a nutrient and secretory organ; its circulation, its metamorphosis of blood and tissues have all to be superintended and directed; the optic nerve, nor the fifth, nor yet again can the third pair answer the requirements of these peculiar processes. The *secretory* element is indispensable, and can only be supplied by the ganglionic or secretory system; without this element in its nervous organization, the eye would not be at any one moment in the status or condition in which it was the moment before. Its circulation would be paralyzed, its secretion and absorption would be null, stasis would be the result, the beautiful transparency of the cornea would be replaced by opacity, and ulceration, disintegration, and finally destruction of the entire organ most certainly ensue.[2]

[1] "The branches of communication are two or three filaments to the outer portion of the inferior maxillary nerve; one or two filaments to the auricular nerve, &c."—*Erasmus Wilson, op. cit.*, p. 484.

[2] See results of experiments before cited.

How, then, is this ganglionic influence conveyed to the interior of the eyeball, and whence does it come? It probably enters along with the filaments of the fifth and the third nerve, and possibly also with the coats of the bloodvessels, but mainly with the nerves mentioned. It has two principal sources, viz: firstly, the carotid plexus, or the first cervical ganglion, and secondly, the ciliary ganglion.

As we have seen, the ophthalmic division of the fifth nerve before entering the orbit, and while yet in the outer wall of the cavernous sinus, and "previously to its division, receives several filaments from the carotid plexus."[1] This plexus is formed, in great part, by branches derived from the superior cervical ganglion, and consequently when this ganglion is destroyed,[2] the eye becomes bloodshotten, and its circulation is modified. The branches of the fifth pair, which are intended to supply ordinary sensibility to the eye, separate from the rest of the nerve after it has received the filaments from the carotid plexus, and proceed towards the back part of the ball; the third pair (motor) having also received "one or two filaments from the cavernous plexus,"[3] enters the orbit and soon gives off a branch for the supply of the interior of the eyeball, which branch, like the sensitive filament from the ophthalmic, approaches the ball of the eye. Here these filaments destined for the ball enter the lenticular ganglion, and obtain a reinforcement of secretory filaments, and thus fully provided with the three kinds of influence necessary, they enter the globe of the eye to supply its delicate tissues, and preside over its various processes of sensation, motion, and nutrition.

In order to present more definitely the various ganglionic and cerebro-spinal connections so repeatedly discussed in the above paragraphs, we here transfer from a recent edition of *Wilson's Dissector*[4] the following illustration and references.

We are now prepared to examine the paradoxical assertion of Magendie, "that a separate influence resides in the fifth nerve, increasing in energy in proportion as the nerve is curtailed," or in other words, the more of the fifth nerve cut off from its connection

[1] Erasmus Wilson, op. citat., p. 439. London, 1844.

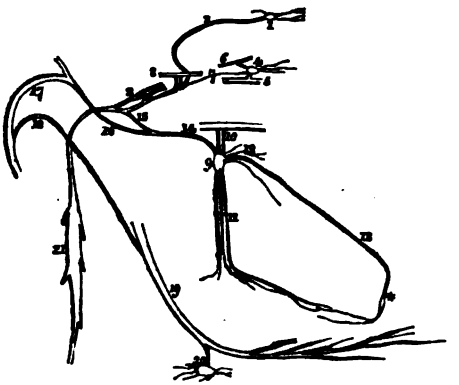
[2] As in experiments by Dupuy, Reid, and others, cited.

[3] Erasmus Wilson, op. citat., p. 433. London, 1844.

[4] Edited by William Hunt, M. D., Demonstrator of Anatomy in the University of Pennsylvania. Published by Blanchard & Lea. Philadelphia, 1856. Page 184, fig. 54.

with the brain and spinal centre, the less was the effect upon the circulation and nutrition of the eye; and when he made the section

Fig. 1.



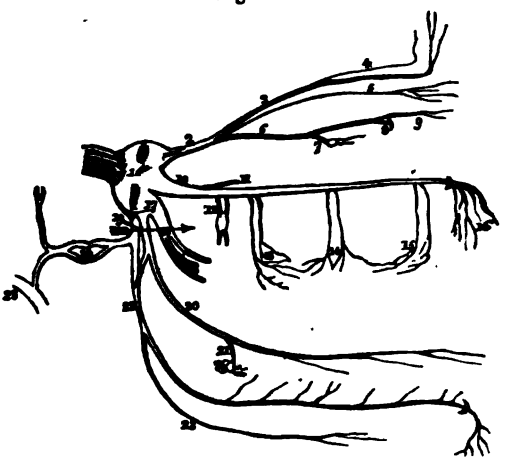
THE CRANIAL GANGLIA OF THE SYMPATHETIC NERVE.—1. The ganglion of Ribes. 2. The filament by which it communicates with the carotid plexus (3). 4. The ciliary or lenticular ganglion, giving off ciliary branches for the supply of the globe of the eye. 5. Part of the inferior division of the third nerve, receiving a short thick branch from the ganglion. 6. Part of the nasal nerve, receiving a longer branch from the ganglion. 7. A slender filament sent directly backwards from the ganglion to the sympathetic branches in the cavernous sinus. 8. Part of the sixth nerve in the cavernous sinus, receiving two branches from the carotid plexus. 9. Meckel's ganglion (spheno-palatine). 10. Its ascending branches, communicating with the superior maxillary nerve. 11. Its descending branches, the posterior palatine. 12. Its anterior branches, spheno-palatine or nasal. 13. The naso-palatine branch, one of the nasal branches. * The point where Cloquet imagined the naso-palatine ganglion to be situated. 14. The posterior branch of the ganglion, the Vidian nerve. 15. Its carotid branch, communicating with the carotid plexus. 16. Its petrosal branch, joining the angular bend of the facial nerve. 17. The facial nerve. 18. The chorda tympani nerve, which descends to join the gustatory nerve 19. The gustatory nerve. 20. The submaxillary ganglion, receiving the chorda tympani nerve from the gustatory. 21. The superior cervical ganglion of the sympathetic.

as far back as the border of the fourth ventricle, thus cutting off the whole of the nerve, no perceptible effect on these processes followed, while all the parts to which the fifth nerve was distributed became paralyzed in both sensation and muscular motion. Dr. Alcock denies the existence of the influence above referred to. Of the two opinions, we decidedly adopt that expressed by Magendie. There is indeed an influence acting in the various sections of the nerve exactly in the manner which Magendie describes—an influence which Magendie attributed to "*some inherent power* in the nerve itself, independent of the brain or spinal marrow," but which we, with all due respect to the opinions of that great man, the father of experimental physiology, and deference to the reasoning of his distinguished reviewer, still feel compelled to assert, is

conveyed to certain branches of the fifth pair by virtue of their connections with the *ganglionic* or secretory system of nerves.

For the more ready apprehension of the subject, we place before the reader another one of the illustrations, with references, taken from the work above cited.[1]

Fig. 2.



THE BRANCHES OF THE FIFTH NERVE.—1. The Casserian ganglion. 2. The ophthalmic nerve. 3. The frontal nerve. 4. Its supra-trochlear branch. 5. The lachrymal nerve. 6. The nasal nerve. 7. Its branch of communication with the ciliary ganglion. 8. The passage of the nerve through the anterior ethmoidal foramen. 9. The infra-trochlear nerve. 10. The superior maxillary nerve. 11. Its orbital branch. 12. The branches of communication with Meckel's ganglion. 13. The posterior dental branches. 14. Middle dental branches. 15. The anterior dental branches. 16. The infra-orbital branches. 17. The inferior maxillary nerve. 18. Its external or muscular division. 19. The internal division of the inferior maxillary nerve. The arrow marks the separation of these two divisions of the nerve by the external pterygoid muscle. 20. The gustatory nerve. 21. The branch of communication with the submaxillary ganglion. 22. The inferior dental nerve, arising by two roots. 23. Its mylo-hyoidean branch. 24. The auricular nerve. 25. Its branch of communication with the facial nerve.

As will be perceived, the above lignograph is a representation of the distribution of the branches of the fifth pair to the eye, the upper and lower jaw, with the teeth of each, and to the tongue, &c. &c., though the organs themselves are not here represented.

Now, Magendie found "that the alterations in the nutrition of the eye were *less complete* and *less rapid* as he receded from the point of branching of the fifth nerve;" and as he cut upon the ocular side of the point of branching, he found these changes to increase. Our explanation is the following: When the section was made anywhere between the point of junction of *secretory* fila-

[1] Wilson's Dissector, p. 177. Fig. 52.

ments with the nerves supplying the eye, then the nutrient function became disturbed, because the secretory influence passing from the ganglionic centre was interrupted, but as he receded with his sections towards the spinal origin of the fifth pair, he more and more avoided producing this interruption—that is, more of these ganglionic filaments were allowed to escape intact, and more of the secretory influence was allowed to be conveyed, until, making his section at the border of the fourth ventricle, they *all* escaped interruption, and the *entire amount* of the *ganglionic* influence was transmitted to the parts, while all the *sensory* and *motory* influences were cut off.[1]

There are many arguments which could be brought to sustain this view of the question, but we regard them as unnecessary. It is truly surprising that Magendie did not see the relation which the results of his own experiments bore to the results of those performed about ninety years (1732) previously by Pourfour du Petit, and still later by others, and the more especially as his own idea of an "inherent, independent influence of the nerve" groped so near to the truth, and was so very suggestive of it. It is even more surprising that his philosophic reviewer, Dr. Alcock, should have mistaken the true explanation, and was almost led to impeach the skill of the great experimental physiologist; but the one, intent upon the determination of the function of a special nerve, could not open his mind to general views and the records of physiology, while the other, intent upon refuting the assertions of his author, confined himself, too, to the special set of experiments under consideration, and failed to see what generalization would have made clear. Truly this was experiment proceeding blindly without her guide and mentor, observation.

We think that we may now venture to say that, besides the results afforded by the oft referred to experiments of Petit, Dupuy, Arneman, Brachet, and Reid, we can legitimately base our reasoning upon those also of Magendie, and that by this transfer of his results to their proper place, the data for our induction with regard to the phenomena of the secretory system have been somewhat increased. Observation here, then, has become experiment, for it will be admitted that observation has here converted a whole series

[1] Since completing the above rather prolonged examination of Magendie's experiments, we are gratified to find that M. Waller, of Bonn, has expressed a similar view of the same results.

of experiments, made by Magendie to determine the functions of the cerebro-spinal fifth pair, into a most valuable series, illustrating a totally different system, viz., the ganglionic or secretory system of nerves. What has been demonstrated in regard to the eye a little consideration will show is a principle pertaining to the distribution of the secretory nerves in all parts of the organism. In the eye, the main intents and purposes of whose organization is to subserve the function of vision, nutrition is only an auxiliary process, and consequently we find the secretory filaments and their function engrafted upon the senso-motory nerves supplying that organ; but there are certain other organs in which the primary object and end is nutrition and secretion; this is the case with the intestinal canal; it is the source of nutrition for the whole animal frame, and here we find the secretory system predominating, while the senso-motory, except in certain portions, is almost ignored and excluded. In the kidney, again, we find an organ entirely devoted to secretion, and entirely under the *immediate* superintendence of the ganglionic system. In close relation with both these apparatuses of nutrition and secretion, do we find a number of powerful ganglia, which send large and multitudinous filaments into the tissues of these organs. On the other hand, in the skin, we have, so to speak, an organ, one of whose main intents is to serve as a tactile and excitor surface to the entire organism; consequently, we find here the sensory nerves most abundant, and sensibility attaining its highest development—its culmination; but this cutaneous surface, besides being the tactile and excitor organ of the body, is also a secretory organ, a vast, complicated, and extended gland, the eliminations from which are highly important to the well being of the individual; consequently, do we also find, placed in convenient juxtaposition to the roots of all its nerves, and in connection with them, *secretory ganglia*, in order to supply the needed element for carrying on this process of secretion. We refer to the vertebral sympathetic ganglia, which doubtless are intended to supply the secretory function to the cutaneous surface; *how* this is done, we are aware, has not as yet been clearly and fully explained, whether by engraftment of filaments upon the sensory nerves, as shown to be the case in the nerves of the eye, or by admixture with the middle coats of the arteries (the most current opinion), but the fact is conceded that such an element is necessary to the circulation of parts *everywhere*, and these ganglia are the most probable sources from which that element is supplied. With the examination of the

above pertinent facts, we terminate our discussion of the secretory system of nerves; others, having perhaps a more direct bearing upon our main question, will be adduced hereafter to the further development and description of the excito-secretory system.

THE EXCITO-SECRETORY FUNCTION OF THE NERVOUS SYSTEM.

In the foregoing examination, we have endeavored to present certain allied facts pertaining to the functions of the two grand divisions of the nervous system, the cerebro-spinal and the secretory, in such a manner as we have deemed best calculated to favor the admission of the deductions contained in the succeeding portion of this essay. We have seen that to the ganglionic system, and to this system alone, are confided all those important and mysterious processes which pertain to nutrition and secretion, or, in the words of Bichat, "those thousand secret operations of a living body."[1] It presides over all our internal chemico-vital actions, superintending and directing all blood-changing processes, and instigating all metamorphoses occurring in the intimate structure of the animal tissues. It is the system for the internal and individual wants of the organism, and its possession enables the being to sustain an independent and individual existence, carrying on, to a certain extent, all strictly organic actions, without the aid of external influences. In corroboration of this view of the subject, we here insert a synopsis of the views of Dr. Davey, copied in the *American Journal of Medical Sciences* from the *London Lancet* of June 25, 1853.

"Dr. Davey read a paper on this subject before the Medical Society of London, the principal object of which was to prove the independency of the organic nervous system, and, what is more, the dependency of the integrity of the cerebro-spinal system in common with all the organism, on it. To prove his position, Dr. Davey brought forward a variety of facts, more or less startling, and these, selected with much apparent care, seemed to tell much in favor of the physiological views insisted on. After some preliminary remarks, intended to show the unsatisfactory and contradictory opinions expressed by our most popular writers on medicine

[1] Op. citat.

(physiology), viz., Wagner, Todd and Bowman, Carpenter, and others, concerning the ganglionic nervous system, he affirmed, on the authority of many good names, that the ganglia of the sympathetic nerve are those parts first formed in the fœtus, and that this same fact obtains equally, it was premised, through the whole kingdom. The early organism of birds was referred to in confirmation of that opinion, which assigns to the solar ganglion and its dependencies an existence anterior to any other part of the animal fabric. Especial reference was made to the two monstrosities recorded by Mr. Lawrence and Dr. Marshall Hall. The first of these, it is known, was born without a brain, but with the spinal cord complete; but the second, still more wonderful, was born without either a brain or a spinal cord. Dr. Davey argued that if, in the latter instance, the functions of secretion, absorption, &c., were duly and efficiently executed or performed without any aid from a cerebro-spinal system, then was this latter in no instance either requisite or necessary in any way to the integrity of such functions in the animal economy. The ganglionic nervous system, said he, is perfect at birth, and its functions are also perfect; this is completely organized, whilst the brain is nothing more than a mere pulpy mass, without any kind of function or use to the individual in possession of the same; the one is in active and increasing operation, the other is but a blank, doing nothing, useless; the ganglionic nervous system executes its function instinctively, whereas the brain, if not the spinal cord, requires time and experience and direction ere it perform its functions, either for good or for evil. Dr. Davey compared the monstrosity of Dr. M. Hall, organically considered, to the lower classes of animal life, the medusariæ; these, he said, performed functions of an instinctive and preservative character, executed those functions only which are strictly vital, such as secretion, absorption, nutrition, and so on; and therefore was it to be inferred, and most fairly and logically, that these same animals were possessed of a sympathetic nervous system and none other; the nervous organism of both the amyencephalous monster and the zoophyte was precisely similar, and their animal functions were on a par. As a further illustration of the opinions advocated, he cited some rare examples of vivisections performed by himself with the view of testing anatomically the relative importance of the ganglionic and cerebro-spinal nervous centres. It was shown that in frogs and fish both the brain and spinal cord may be destroyed, and that, nevertheless, all the

strictly vital functions will continue to be carried on as before. These animals, it was observed, offered peculiar facilities for the performance of such experiments, from the peculiarity of their respiratory apparatus; but, added the author, you have only to establish an artificial respiratory process or function in the higher order of animals, *i. e.*, those who breathe normally with the aid of a complex set of nerves and muscles, for that which is purely natural, and then may the spinal cord and brain be destroyed with an almost equal impunity, so far as the said vital acts are concerned in them. The phenomena of sleep and disease were referred to as offering strong and corroborative evidence of the physiological opinions insisted on; and, in so far as the latter is concerned, Dr. Davey mentioned that the wards of any lunatic asylum would afford many instances of individuals who were reduced to a mere vegetative or organic existence by disorder affecting the brain and spinal cord; such patients, he said, lived oftentimes many years with their cerebro-spinal organism so disorganized as to be perfectly useless to them; unconscious, without feeling, emotion, or desire, void of thought, without hope, joy, or passion, lost to all normal sensation, or, perhaps, without feeling of any kind, and incapable of only the most imperfect motive power, enfeebled, paralytic, they nevertheless digest, secrete, absorb, in a word, carry on, year by year, the strictly vital functions, exactly as the malorganized fœtus does; exactly as the frog or fish, deprived of the brain and spinal cord, did; and exactly as the polypus is in the habit of doing. He then referred the Society to the experiments of Sir B. Brodie, performed many years since, for the purpose of proving that those nerves having a cerebro-spinal origin had no kind of influence on the reparation of injuries, and so on. Frogs, guinea pigs, and dogs, were the subjects of Sir B. Brodie's experiments; and it was found that the destruction even of the lumbar spinal cord, much less that of the crural and sciatic nerves, neither retarded nor impaired, in any way, the reparative process in the lower extremities;[1] thus, wounds and fractures made in the limbs so deprived of cerebro-spinal nervous influence healed and united as readily and completely as under all ordinary circumstances. Dr. Davey explains the facts recorded by Sir B. Brodie by saying that the ganglionic nervous power was necessarily left intact, and

[1] The more recent experiments of Brown-Séquard corroborate these results of Sir Benjamin Brodie's experiments.

this it was which caused the wounds to heal and the fractures to unite, and insisted on it that, although great and serious injuries to the brain and cord were borne with impunity, and for the reasons above stated, yet were such altogether impossible in so far as the solar ganglion and its dependencies were concerned. It was very truly said that a comparatively feeble blow on the epigastrium over the solar ganglion would destroy life, and that it was a very common thing among boys to suffer greatly from slight and accidental blows taking effect on the pit of the stomach; and the great danger of physical violence, even in a slight degree, to the epigastrium was well known to the prize-fighting gentry, who forbade the combatants to strike below the sternum; and if, as the author asserts, the solar ganglion be the seat of life, the *locale* of the *impetum faciens* of old writers, the irritability, the motions without force, of Haller, then can we easily account for the facts just cited."[1]

From a consideration of the facts in relation to the monstrosities here adduced, and also from the analogies to be found in the animal kingdom and in pathological records, also referred to, we find that an independent existence can be maintained under the *sole* influence of the secretory system of nerves. But the human being, in its extra-uterine life, and also most of the lower animals, are not mere vegetative existences, but organisms, maintaining *relations* with the external world. In the normal condition, there are no independent entities among the higher classes. For, maintaining external relations, the being is endowed, as we have seen, with a nervous system of relation, which is the cerebro-spinal, the other grand division of the nervous system. This cerebro-spinal system has been subdivided into two portions, viz., the nerves of sensation and those presiding over muscular action. A *relation* has been discovered to subsist between these two portions of the nervous system, by virtue of which the sensory nerves have been found to act as excitors to the motory; and hence this system has been termed by Dr. Marshall Hall the *excito-motory* system of nerves. Now, as we hope more fully to set forth in the present discussion, these same sensory nerves are not only excitors to the *motory* system, but, under certain circumstances, most of them sustain an analogous relation to the *secretory* nerves, exciting them, and modifying their action, dimi-

[1] On the Physiological Uses of the Ganglionic Nervous System, American Journal of Medical Sciences, vol. xxvi. p. 457.

nishing, increasing, and altering the secretions, according to the extent and character of the excitation applied. It will be our object, then, to show that the sensory nerves, or, at least, some of them, sustain to the other two portions of the nervous system a *double* relation: first, excitors to the motory system, giving rise to the excito-motory system described by Dr. Marshall Hall in 1837; and,

Secondly, excitors to the *secretory* system, resulting in the *excito-secretory* system, enunciated first in this country in the year 1850,[1] and which second system Dr. Marshall Hall did not appear anywhere to recognize until the present year, 1857.[2]

In the establishment of our proposition of the excito-secretory function of the nervous system, we will present and discuss certain phenomena of the animal economy, which we think will answer well our purposes of illustration.

We have said that the cutaneous sensitive nerves are the excitors to the secretory system as well as to the motory. It has long been observed that there exists a well-marked correlation between the cutaneous surface without and the secretory surfaces within, and that the action of these organs is influenced in a marked degree by impressions made upon the external surface. The sudden exposure of the body to a cold atmosphere, or to a cold stream of water, it is well known, will increase the urinary secretion.

These phenomena have been variously explained. One of these explanations is, that there subsists an antagonism between the cutaneous surface and the secretory surfaces of the kidney, or the bowels, as the case may be. This doctrine of antagonism we regard as entirely unphilosophical, whether applied to the kidney, to the mucous surface of the bowels, or to any other portion of the animal organism. There is no such principle, in our humble opinion, as antagonism to be recognized in any of the operations of nature in her conduct of the vital processes, but a beautiful correlation and reciprocity are everywhere manifest in her economy.

[1] An Essay on the Influence of Dentition in producing Disease. By Henry F. Campbell, M. D., Demonstrator of Anatomy in the Medical College of Georgia.—*Southern Medical and Surgical Journal*, vol. vi., June, 1850.

We deem it proper here to state that all reference, either by note or in the text, to the previous publications of the author of this essay, were excluded from the manuscript presented to the committee; these annotations have been made subsequently to the award of the prize by special permission.

[2] London Lancet, March, 1857, Amer. ed.

Nor yet again can we justly account for these sequences upon the theory of revulsion, or a driving in of the blood upon the secretory organ. The real explanation is far more simple, and far more in accordance with the recognized principles of action in the nervous system. Under favorable circumstances, we irritate an excitor nerve and we stimulate muscular contractions, evidencing the existence of the excito-motory function. Now, under the circumstances above related, the excitor or sensitive nerves, having received an appropriate stimulus, excite, through the medium of the spinal centres, the action of those ganglia and filaments dominating the secretory organs in question; they control, as we have seen, their circulation; they preside over their secretion, and thus stimulated, they are excited to modify the circulation and the secretion. So far, this is a normal act, the result of that ordained and wholesome correlation established between these two portions of the organism through these two systems of nerves, the sensory and the secretory; but, should the excitation be unusually strong, amounting to what is popularly termed a "shock," or too prolonged, we find the secretory system acting unduly, and this action is then carried to an abnormal extent; the *dynamic* act so modifies the circulation that secretion becomes aberrated, or even arrested, and, perhaps, a change in the condition of the tissue from altered nutrition may result. Dr. Marshall Hall thus remarks, in his recent article[1] upon this subject: "A partial keen current of air, falling on *any* susceptible portion of the skin, may induce inflammation in any susceptible internal organ. An extensive burn or scald is apt to induce pneumonia."

It is in this way, then, viz., by the doctrine of the excito-secretory function of the nerves, that the above familiar, though, until a few years past, mysterious phenomena, have received their interpretation. But in order to study the excito-secretory system in its most definite and obvious relations, it will be necessary to select some portion of this system wherein a single excitor-nerve will be found to exercise its influence over an extended region, becoming productive of a diversity of results. We have already examined somewhat *in extenso* the distribution and connections of the fifth pair of nerves; we now select this portion of the nervous system as the most suitable excitor, the discussion of whose connections and phy-

[1] London Lancet, March, 1857, American edition.

siological relations, upon which we may illustrate the principle of excito-secretory action. We have seen that in its distribution it is displayed upon parts endowed with the most exquisite sensibility; that its connections with the secretory system are most intimate and abundant, a portion of the ganglionic system being engrafted upon it; and that, finally, in its central attachment, it is found implanted into that portion of the cerebro-spinal axis, which is generally conceded, and which the recent experiments of M. Bernard have demonstrated to exercise a more extensive influence over the vital processes of the organism than any other one portion, viz., the medulla oblongata.[1] This fifth nerve thus centrally connected, will be recollected to send certain filaments to the sensitive parts about the eye, certain others to the teeth, and also sensitive branches to the head and face.

What, then, are some of the phenomena occurring in the region of this nerve which are found to illustrate the function of excito-secretion? We think that the instances are varied and abundant. First, then, in regard to the eye particularly: under certain circumstances, the sensitive conjunctival surface of the ocular globe is exposed to a sudden draft of air, or to some more mechanical irritant. The first effect occurring from this exposure is, an immediate increase in the secretion of the lachrymal gland. This may continue, or it may be entirely arrested after continuing for a time. Secondly, the eye becomes perhaps dry, or it may become congested and secrete a puriform fluid, which, drying, closes the lids; or it may become entirely *bloodshotten* or *ecchymosed*, and in very favorable conditions, ulceration and even opacity of the cornea may result from this "taking cold." This is a condition of the parts, though arrived at much more gradually, which we find resulting from the experiments so repeatedly referred to in this paper, and our explanation of them is, that the sensitive fifth nerve becomes excitor through the spinal centre, to the modifications in the circulation, secretion, and nutrition of the eyeball, which acts are under the immediate reign of the ganglionic system. We can observe the same character of phenomena in the secretory lining membrane of the nostril; and also the same exposure to cold may, through the

[1] "Which last (the medulla oblongata) may no doubt be considered to be intermediate between the ganglionic and spinal systems, and partaking to some extent in the attributes of both."—Prize Essay on the Arterial Circulation in its Physiology and Chief Pathological Relations. By Henry Hartshorne, M. D.—*Transactions of Amer. Med. Association*, vol. ix.

fifth nerve, or other sensitive nerves, excite modified circulation in the fauces and pharynx through the secretory or mixed branches which, together with the pharyngeal plexus, control the circulation of those mucous surfaces.

We will now refer to another form of irritation, and more local, but attended by almost identical results. How much a subject of every day observation has it become, that certain irritations in the buccal cavity are competent to affect the circulation of the eye! A few months since, we were in attendance upon a case wherein an eye which had previously been operated upon; after entire immunity from disease of every kind, became first slightly affected with linear congestion, the lachrymal secretion was greatly increased, then it became painful and bloodshotten, with slight ulcerations upon the cornea. This condition had continued for over a month, when, at the suggestion of a distinguished friend,[1] a *carious tooth* was extracted from the upper jaw of the side corresponding to the affected eye. The result was most marked and satisfactory; the pain, the flow of tears, and the congestion rapidly subsided, the parts regained their natural state, and the patient was entirely relieved. To trace the nervous connections, and to give the *rationale* of the above phenomena, is scarcely necessary at this stage of our discussion. Suffice it to say, that the dental irritation was here propagated to the spinal centre giving origin to the fifth nerve, and was then reflected upon the eye, lachrymal gland, &c., through the ganglia and filaments of the secretory system, controlling the nutritive and secretory processes of the eye.

In a consideration of this relation of the teeth to the sensory or excitor branches of the trifacial, and through them to the spinal marrow, and thence to the entire secretory system, is to be found nearly all that is necessary for the full portrayal of the excito-secretory system. For in the phenomena which sometimes result from these relations under peculiar circumstances, are to be found illustrations of almost every character and degree of modified secretion and nutrition. Let us, as has been done by us on former occasions,[2] here examine the varied phenomena of that period of in-

[1] Prof. Paul F. Eve, of Nashville, Tenn.

[2] See Essay, above cited, on the "Influence of Dentition in producing Disease."—*Southern Medical and Surgical Journal*, June, 1850.

Secondly. Article on "Sympathetic Nerve in Reflex Phenomena." By Henry F. Campbell, of Georgia.—*Transactions of American Medical Association*, vol. vi., May, 1853.

Thirdly. A letter to Dr. Marshall Hall, of London, entitled, "A Claim of Priority

fantine existence ordinarily termed the process of dentition. At this time the growing teeth begin to press upon the surrounding parts, which parts, and the teeth themselves, are supplied by the filaments from the fifth pair of nerves; the gums become sensitive, evincing great *local* irritation. Besides this local irritation, there are very generally other, and some of them much graver, affections attending the process of dentition, many of them, plainly, well-marked instances of aberration in secretion and nutrition. Thus the eye becomes lachrymose and congested, the Schneiderian membrane is also congested, and pours out an abundant secretion; the secretion of the intestinal mucous membrane is altered and increased to such an extent as to produce "the diarrhœa of teething," or cholera infantum.

In the discussion of these affections we do not wish here to occupy much space, as they have been fully, and, we think, rationally explained elsewhere.[1] Another class of affections, however, which attend the period of dentition, have never elsewhere been satisfactorily accounted for, nor their etiological connection with this process clearly made out; all admit that they are *concomitants* of dentition, but no one has ever explained *how* they may be the *results* of that process of evolution. We refer to those troublesome cutaneous eruptions so common among teething children. That they have a connection with this process, their popular name will plainly indicate, for some of them are called "tooth rashes" in common parlance. These eruptions, as is well known, vary much in character and degree, the milder being a mere roseate suffusion, while others assume the more refractory forms of vesiculæ, papulæ, squamæ, &c. &c., which are apt to continue during the whole period of teething.

Now, for these concomitants of dentition, there had never been presented any rational and satisfactory explanation, until they were referred to as illustrating the doctrine of excito-secretory action in 1850.[2] A comprehension of this doctrine affords to them a ready interpretation by referring them to the modified action of the secre-

in the Discovery and Naming of the Excito-secretory System of Nerves." By Henry Fraser Campbell, M. D., Member of the American Medical Association, &c. &c.

The above letter has been transmitted to the *London Lancet* for publication, and was published in this country in the *Southern Medical and Surgical Journal*, April, 1857. This claim was laid before the Association at its last meeting in May, 1857.

[1] Essay above cited. [2] Loc. citat.

tory system controlling the capillary circulation of the cutaneous surface, which modification is excited through the dental filaments of the fifth pair, the spinal marrow, and that portion of the ganglionic system above referred to.

The verification of the above view of the influence of these connections, and also of the effect of the local irritation, we ask leave here to adduce an observation which we are not aware has been recorded elsewhere. It is generally admitted that at the termination of the period of dentition, that is, when the child has acquired all its teeth, the cutaneous eruption, of whatever nature it may have been, subsides, and the skin resumes its natural condition, the patient not again being liable to its return. This, according to our observation, is generally, but not invariably, the case. We have observed certain instances in which the eruption had subsided for several years, when on the advent of the *second* dentition it came out with almost its former violence and inveteracy, not subsiding until the *second* period was entirely completed. So frequent has this return of the eruption been a subject of remark with us, that we now seldom encourage parents to expect permanent relief for their children, affected with these eruptions, until after the completion of the *second dentition*. Again: we find that children who have suffered severely during the period of dentition, are very liable to become affected with *dropsy*, this latter affection frequently presenting itself as the termination of the above cases. Since the announcement of the excito-secretory function of the nervous system, these cutaneous eruptions and dropsical affections which occur during dentition, in our opinion, need no extended and elaborate explanation. We deem it, however, proper to refer to the significant and most apposite fact, that when Dupuy extirpated the superior cervical ganglia in horses, "there resulted an *eruption over the whole cutaneous surface*, with *emaciation* and an *œdematous state of the limbs*;" may we not trace the cause of these analogous states occurring in dentition, to the prolonged aggression made by the dental irritation through the fifth nerve upon those secretory centres which control the capillary circulation of the cutaneous surface.

We are aware that the above phenomena, indicating embarrassed or aberrated action in the secretory system of nerves, might receive an explanation in the fact, that during this period several of the important emunctories of the system, as the liver and the kidney, suffer an arrest, or at least a modification in their eliminatory functions; but we will not contend here for the difference in the value

of these two opinions; either one of them can only rationally explain the phenomena by invoking the aid of the excito-secretory action originated by the irritation caused in the branches of the trifacial during the evolution of the teeth.

The *urinary secretion* is much influenced throughout the period of dentition. "Hunter,[1] and afterwards Underwood,"[2] says Dr. Laycock,[3] "remarked the connection between the teeth and the kidney and bladder in children; the growth of the former being accompanied with increased flow of urine, symptoms of gonorrhœa, and of stone in the bladder, and involuntary micturition. Mr. Bingham corroborates these observations," &c. At an early period of our connection with the study of medicine, we were led to investigate the relation which the process of dentition bore to this particular set of concomitants, and in the consideration of these relations were first traced out those connections between the cerebro-spinal *excitor* nerves and the ganglionic secretory nerves which constitute the basis of the excito-secretory function in every portion of the organism. Our observation, then, led us to the opinion that this increase of renal secretion was caused by *reflected peripheral* irritation from the growing teeth upon the dental branches of the fifth pair, which irritation being transmitted to the spinal centre giving origin to this sensitive nerve, rendered it an excitor to the secretion of the kidneys through the ganglionic system presiding over that particular function. A more thorough investigation of the anatomical relations of the trifacial, and especially of its final central connection with the cerebro-spinal axis, have only served to strengthen the above convictions, and while placing our *observed facts* in philosophical relation with some of the recent experiments of M. Claude Bernard, of Paris,[4] we are more fully convinced of their significance. Dr. Alcock[5] thus traces the trunk of the trifacial from the surface of the crus cerebelli to its real origin: "The course of the larger packet" (which is the sensitive) "is also beneath and before that of the lesser, and hence in the usual mode of dissection, in which the brain is reversed, it presents itself first.

[1] The Natural History of the Human Teeth, p. 234.

[2] On Diseases of Children. Ninth edition, edited by Dr. Marshall Hall; p. 252. London, 1835.

[3] Essay on Hysteria, p. 86, American edition. Philadelphia, 1840.

[4] *Vide* Leçons de Physiologie. Paris, 1854 and 1855.

[5] Cyclopedia of Anatomy and Physiology, vol. xi. p. 271, art. Fifth Pair of Nerves.

Its direction is backwards, downwards, and inwards, towards the upper extremity of the spinal bulb; . . . . it is then situate in the angle formed by the three peduncles of the cerebellum at their junction with the hemisphere; behind the middle, beneath the superior, and above the inferior, and before—or in common language, *beneath the floor of the fourth ventricle.*" He further quotes Soemerring,[1] that "it appears to arise almost *from the very floor of the fourth ventricle.*" The following lignograph, No. 140 *Todd's Cyclopedia of Anatomy and Physiology*, will more fully illustrate the central connection of the fifth pair.

Fig. 3.

LATERAL VIEW OF THE PONS, SPINAL BULB, AND COURSE OF THE FIFTH NERVE IN MAN.—1. Pons Varolii. 2 Spinal bulb. 3. Olivary body. 4. Spinal cord. 5. Superior peduncle of cerebellum. 6. Cut surfaces of middle cerebellum. 7. Inferior peduncle of cerebellum. 8. Cut surface of crus cerebri. 9. Ganglion of fifth nerve reversed. 10. Ganglionic portion of the nerve. 11. Non-ganglionic portion of fifth nerve. 11'. Roots of non-ganglionic portion. 12. Eminence at the insertion of both portions of the fifth nerve. 13 Fasciculus to anterior column of spinal cord. 14. Fasciculus to posterior column. 15. Auditory nerve. 16. Portio dura. 17. Posterior roots of superior cervical nerves.

"I have adopted," says Erasmus Wilson,[2] "the origin of this nerve given by Dr. Alcock, of Dublin, in the *Cyclopedia of Anatomy*

[1] De Corpori Humani Fabrica. 1798.

[2] Dissector's Manual of Practical and Surgical Anatomy. Second edition. London, 1853. P. 341, note.

and Physiology, as the result of his dissections. Mr. Mayo also traces the anterior root of the nerve to a similar origin."

We also here adduce the high authority of Dr. R. B. Todd[1] in relation to the connection of the trifacial with the floor of the fourth ventricle. "The ordinary columns are seen distinctly in their ascent to the brain *in the fourth ventricle*, as two cylinders (A, F, Fig. 4), *which form the floor of that cavity*. . . . . We here see distinctly that these columns" (which form the floor of the fourth ventricle) "are the source of origin of these nerves (the seventh pair), and no doubt they are equally so of all the nerves which are connected with the medulla oblongata, namely, the *fifth pair*, the eighth, the ninth, and probably also the sixth." The cut used by him is taken from Foville, and we here introduce it.

Fig. 4.

POSTERIOR VIEW OF THE MEDULLA OBLONGATA, WITH MESOCEPHALE AND PART OF CEREBELLUM OF AN INFANT.—S. Pineal gland. D. Nates. D'. Testes. ++. Points of emergence of fourth pair of nerves. Y. Posterior pyramids. X. Restiform columns. A, F. Floor of the fourth ventricle, formed by the olivary columns, the fissure between which is the calamus scriptorius. Y'. Posterior surface of mesocephale. B. Valve of Vieussens. N. Anterior surface of crus cerebri. R. Corpus dentatum or rhomboideum.

Some time in 1852 (so far as we can ascertain by reference to records at hand), Mons. C. Bernard, of Paris, performed certain

[1] Descriptive and Physiological Anatomy of the Brain and Spinal Cord and Ganglions, &c., p. 177. London, 1845.

experiments to determine the influence of the galvanism of certain nerves upon the secretory functions of various organs. Having abandoned these, he next instituted others, which more recently we find clearly and satisfactorily illustrated in his lectures delivered at the College of France during the sessions of 1854 and 1855, and published, Paris, 1855 and 1856.[1] These brilliant experiments have won for M. Bernard a well-earned and enduring fame, and have done much towards the advancement of physiological science.

"We find," says a recent writer,[2] "as might be expected, minute details regarding the mode in which Bernard performs his celebrated experiment of inducing *artificial diabetes* by pricking a certain point of the *medulla oblongata* either of a herbivorous or a carnivorous animal; but, until we read these lectures, we were not aware that he had extended his experiment in the manner described in the following paragraph: 'When we prick the mesial line of the floor of the fourth ventricle in the exact centre of the space between the origins of the auditory and pneumogastric nerves, we, at the same time, produce an exaggeration of the hepatic (saccharine) and of the renal secretions; if the puncture be effected a little higher, we very often only produce an augmentation in the quantity of the urine, when this frequently becomes charged with albuminous matters, while if the puncture be below the indicated point, the discharge of sugar alone is observed, and the urine remains turbid and scanty. Hence it appears that we may distinguish two points, of which the inferior corresponds to the secretion of the liver, and the superior to that of the kidneys. As, however, these two points are very near to each other, it often happens that, if the instrument enters obliquely, they are simultaneously wounded, and the animal's urine not only becomes superabundant, but, at the same time, saccharine.'" We here copy a cut from Bernard, showing the relation of the parts, and the point of pricking the floor of the fourth ventricle.

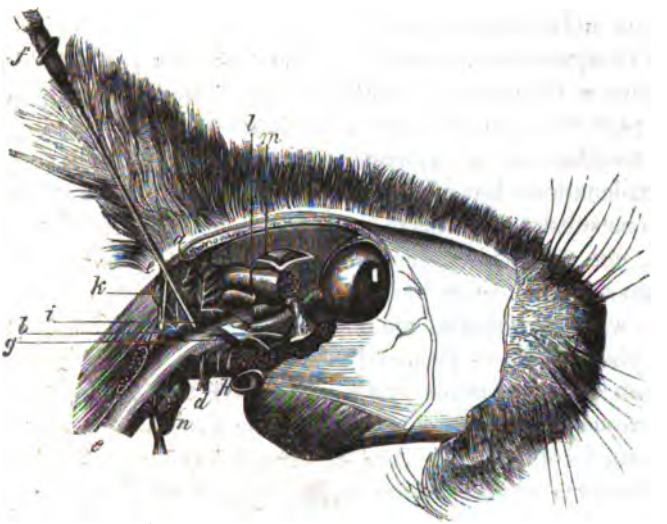
It will be seen, by examination of the above figure, that the place indicated for introducing the point, *i*, of the piercing instrument, *f*, in order to increase the secretion of urine, and to change its character, is very near to the implantation of the root of the fifth pair of nerves, *g*, in the following figure. Hence, we may fairly say that the above operation, performed, as it appears from

[1] Leçons de Physiologie Expérimentale, &c.

[2] British and Foreign Medico-Chirurgical Review, No. xxxvii., Jan., 1857, p. 32

M. Claude Bernard's work,[1] on the 13th of February, 1855, proves *experimentally* that irritation made in a spinal centre is competent

Fig. 5.



Section of a Rabbit's Head to show the Direction of the Perforation. *d.* Cerebellum. *b.* origin of the seventh pair of nerves. *c.* Spinal marrow. *d.* Origin of the pneumogastric nerve. *e.* Orifice by which the instrument enters the cranium. *f.* Instrument. *g.* Fifth pair of nerves. *h.* Auditory canal. *i.* Extremity of the instrument reaching the medulla after traversing the cerebellum. *k.* Occipital venous sinus. *l.* Tubercula quadrigemina. *m.* Cerebrum. *n.* Section of the atlas.

to excite and to modify the secretory function of the abdominal viscera, which function is exercised under the reign of the ganglionic system, the parts in which it goes on being only intermediately connected with that spinal centre thus irritated. This fact, thus proved in *experiment* by M. Claude Bernard, the records of American medicine will show, was recognized and announced from *observation* in June, 1850.[2] In M. Bernard's *experimental* investigation, the irritation was applied directly to the nervous centre; in the induction from *observation*, *peripheral* irritation through the dental branches of the fifth nerve was recognized as competent to excite the secretion, and modify the products of secretion. The *observation* here, and not the more recent *experiment*, was the real parent of the principle of *excito-secretion*. The conclusion arrived at, from the observation of pathological phenomena, em-

[1] Op. citat., p. 288.

[2] Southern Medical and Surgical Journal, vol. vi. p. 321.

braced all the *elements* of the excito-secretory function, viz: first a sensitive nerve as an excitor; secondly, a cerebro-spinal centre: thirdly, the secretory nerves and ganglia. M. Bernard's experimental results were *deficient* in the first of these elements, viz., the sensitive nerve as an excitor.[1]

To illustrate the connection of these various parts with the two divisions of the nervous system, we have introduced another figure from page 322 of M. Bernard's excellent work:—

In transferring to our pages the next figure, we have omitted the explanations, but would here remind the reader that analogous relations subsist between the secretory filaments of the alimentary canal, not represented here, and the cerebro spinal centres and cerebro-spinal sensitive branches.

We will make special reference to only one more set of pathological phenomena, as peculiarly illustrative of the excito-secretory function of the nervous system; we refer to some of those very mysterious aberrations of secretion found so uniformly concomitant with attacks of *hysteria*. Almost universal opinion has referred the manifestations of this disease to irritation of one kind or another, in the generative organs of females, viz., the ovaria, neck of the womb, and the uterus itself. It is a significant fact, that females laboring under this disease should so frequently manifest modification in their *urinary* secretion. "It appears, indeed," says Laycock, "that some alteration in the quantity or composition of the urinary secretion is one of the most constant symptoms of hysteria, even in its mildest form, when the patient can only be said to have a hysterical constitution."[2] "Limpid urine," in large quantities, is nearly always a concomitant, and Dr. Laycock also refers to "the profuse sweats and *salivation* of hysterical females." We regard all these secretory phenomena as fully explicable, by referring them in many instances to the excito-secretory function.

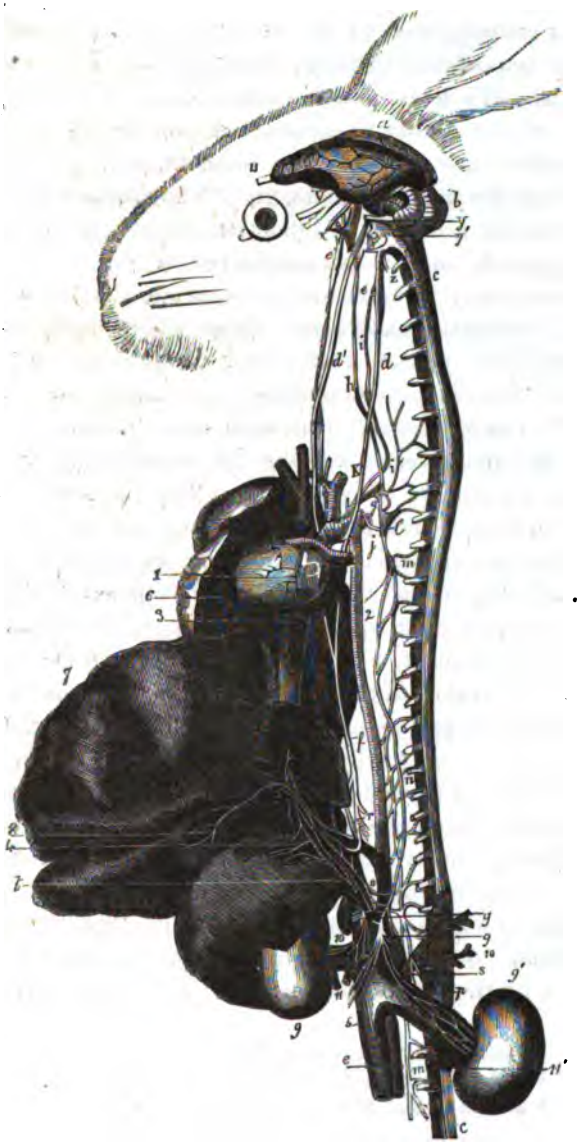
The records of both physiological and pathological medicine, would furnish a still more abundant treasure of facts, which could be made to corroborate our views in reference to this function of the nervous system, but such an extended discussion would not be consonant with the object of the present paper. Our earnest endea-

[1] We have not tested in any instance the chemical properties of the urine of teething children, but we would here respectfully suggest that it will be found to contain *sugar* in those cases in which the increased urinary secretion presents a prominent feature in the concomitants of dentition.

[2] Op. citat., p. 86.

vor has been to bring together from all sources, however diverse and unpromising, a sufficient number of kindred facts to establish,

Fig. 6



Cerebro-spinal and Splanchnic Nervous Systems of a Rabbit, showing the nervous connections existing between the liver, lung, and kidney, to explain the production of artificial diabetes.

more fully, perhaps, than has heretofore been done, the physiological and pathological relations of the excito-secretory system of nerves. This dissociation of old facts from their accustomed and apparently *established* relations, and the transferring of them to new ones, may have given to our discussion an aggressive aspect, by no means intended or contemplated by us. We disclaim all intention to underrate the importance of other investigations, or to misinterpret their results. We have, in a few instances, it is true, endeavored to the best of our ability to correct the conclusions of some who have preceded us, but never, for a moment, prizing less the real significance of the data in discussion. "The ultimate attainment of truth," writes the great Sir William Hamilton,[1] "has ever been by *gradual approach*," and, as not unkindred to our theme, we quote his apt illustration: "The history, in regard to the discovery of the distinction between sensitive and motor filaments in the nerves, finally established by Sir Charles Bell, was only the last of a long series of *previous observations* tending to the same effect;" or, in the words of Professor Whewell, "the facts were known, but they were insulated and unconnected till the discoverer supplied, from his own stores, a principle of connection. The pearls are there, but they will not hang together till some one supplies the string."[2] By diligent observation and careful induction, we have, for years past, been endeavoring to find this principle of connection, and to place these pearls upon their appropriate string; if, in the earnest and honest investigation of a somewhat new and obscure subject, we have failed to develop all that the advantages, previous suggestions, and the rapid progress of science must unfold in this extensive field of inquiry, we can only refer to the recent expression of Dr. Marshall Hall,[3] that "this vast subject demands a most extensive and cautious series of *experiments* and *observations*. The efforts of many laborers, through many years, will be required fully to develop the two sub-systems of the Diastaltic Nervous System." We must cordially agree with him, but would here humbly, but most earnestly ask, that "observation" be allowed to occupy her true and equal place by the side of "experiment" in all these investigations.

[1] Philosophical Works, p. 400, note.

[2] Philosophy of the Inductive Sciences, vol. ii. p. 48.

[3] London Lancet, March, 1857, American edition.

PRIZE ESSAY.

EXPERIMENTAL RESEARCHES

RELATIVE TO THE

NUTRITIVE VALUE AND PHYSIOLOGICAL EFFECTS

OF

ALBUMEN, STARCH, AND GUM,

WHEN

SINGLY AND EXCLUSIVELY USED AS FOOD.

BY

WILLIAM A. HAMMOND, M. D.,

SURGEON U. S. A.

Quem sequimur? quove ire jubes? ubi ponere sedes?
Da pater augurium, atque animis illabere nostris!

PRIZE ESSAY.

INTRODUCTION.

From the first moment of existence to its termination, two processes are constantly progressing in the healthy organic being. The first of these, Nutrition, is that by which the several tissues of the body are primarily formed, and subsequently developed and nourished; the second, Decay, is the direct antagonist of the former, and through it, those portions of the organism which have performed the office in the economy for which they were assimilated, are decomposed into simpler substances, and after undergoing continued metamorphosis, are eventually excreted from the system. The continuation of these forces constitutes life, the cessation of either of them, for even a limited period, induces death.

The present memoir embraces the consideration of these actions, as they occur in the human system, under certain fixed conditions of alimentation, and is especially intended to show by actual experiments, in what manner they are affected by albumen, starch, and gum, when singly and exclusively used as food.

It does not comport with the character of this essay to enter into an elaborate detail of the ordinary course and phenomena of nutrition, or of the destructive metamorphosis of the animal tissues, neither would this be necessary, for, the works of Liebig, Carpenter, and Draper, and the erudite and philosophical treatise of Lehmann, are so readily accessible to the profession, as to render such a procedure a work of supererogation; yet, a few words in relation to some of the principal points connected with them, may not be altogether out of place, and with a statement of the scope of the present investigations, and of the methods employed in the necessary analyses, may serve as an introduction to the more immediate subjects of experiment.

The food which is required by man to maintain a proper degree of activity in the several functional actions of the system, and to repair the waste in the tissues induced by them, may be divided into four classes.

1st. The protein-compounds; albumen, fibrin, casein, gluten, &c., whose most important element is nitrogen, and whose office in the organism is particularly of a histogenetic character.

2d. The fats; which serve for the maintenance of the animal heat by undergoing oxidation into carbonic acid, and water, enter into the composition of the primary cells of the tissues, and are probably, active agents in the solution and metamorphosis of the nitrogenous articles of food.

3d. The carbo-hydrates; starch, sugar, gum, &c., some of which, like the fats, serve to support the heat of the body, and which, within the system, may undergo transformation into them.

4th. Inorganic substances; under which head are included water, and certain minerals which enter essentially into the composition of the blood and tissues.

Besides the above, various other substances, such as alcoholic liquors, coffee, tea, spices, &c., are frequently taken into the stomach with the food, strictly so called, which, though not contributing directly to the nutrition of the body, are yet often serviceable in promoting digestion, and restraining the too rapid waste of the animal tissues.

Though albumen (the type of the protein-compounds) contains carbon, hydrogen, and oxygen, in addition to nitrogen, and is, therefore, *par excellence*, the tissue-forming material, it has been determined by experiments upon the inferior animals, that a sufficiency of such food to sustain vitality for any length of time, cannot be assimilated by the digestive organs; and that, unless fat, starch, or some other of the respiratory aliments, together with a proper amount of inorganic salts, be also ingested, the animal soon perishes with all the symptoms of starvation.

In order, therefore, to keep the vital functions at their maximum healthy standard of action, it is essential that the food should be so adjusted in quantity and quality, as to subserve all the purposes of plastic formations, and, at the same time, maintain the calorific process at its due degree of activity.

Though instinct and experience are generally sufficient to make such an arrangement of aliments as is adequate to fulfil the ordinary requirements of the system, yet, observation is constantly

teaching us, that these guides are not of themselves always correct in their indications, and that disease, and even death, are frequently induced from the want of a more enlightened system of dietetics.

An extensive series of observations is necessary, before we can arrange such a system; before we can so proportion the different classes of food to the individual as to be able to determine, *à priori*, how much of each should be ingested under certain defined conditions and circumstances. Such investigations should especially embrace the determination of the quantities and qualities of the egesta under definite conditions of food, mental and physical exercise, sleep, &c.; repeated analyses of the blood should be made, and at the same time, note taken of all the physical, physiological, and pathological circumstances, capable of influencing the results. In addition to the correct ideas of nutrition, and the other physiological processes, which researches of this nature carried on for a long period would give us, we should also be far advanced towards the attainment of that exactness in medical science, to which all our efforts should be directed.

The theory at present received, explanatory of the process by which the disintegration and metamorphosis of the animal substance occurs, may be briefly stated as follows:—

No part or organ of the body can exercise its functions without a certain portion of the tissue entering into its composition losing its vitality. Interstitial death is thus coeval and coexistent with life.

The bodily material which has become devitalized, re-enters the circulation, and mingles with the general mass of the blood. "No organized substance, no part of any plant or animal, after the extinction of the vital principle, is capable of resisting the chemical action of air and moisture."[1] The effete tissue meets in the blood-vessels with both oxygen and water, and also with a temperature which experiment has demonstrated to be that at which decomposition most readily takes place. Under the combined influence of these agents, the worn-out material is resolved into less complex substances, and is at length, under new forms, eliminated from the system.

Your great channels serve to rid the organism of the products resulting from the decay of its component parts; the lungs, through which carbonic acid, water, and a small portion of nitrogen escape;

[1] Liebig's Letters on Chemistry, London ed., p. 211.

the skin, eliminating principally water, with some carbonic acid and salts; the intestines, through which (in addition to the unassimilated residue of the food) decomposed bile, gases, &c., are excreted; and the kidneys, giving exit to water, salts, and especially nitrogenous substances.

As previously remarked, in order to exhibit fully the extent of the nutritious and regressive metamorphosis of tissue in a definite time, and under certain conditions, the ingesta and excreta of the same period should be carefully measured, and the nature and quantities of their several constituents exactly determined. In addition, the weight of the body should be accurately taken at stated intervals during the continuance of the investigations, and observations frequently made of the density, moisture, and temperature of the atmosphere.

The ensuing researches, though conducted generally on this plan, are yet far from being perfect, and can only be regarded as affording approximative results. In the present state of our knowledge the difficulty, if not impossibility, of estimating accurately the total amount of oxygen abstracted from the inspired air, and retained in the system, and the loss from the lungs, and the skin separately, is a bar to precise investigation. Nevertheless, I am sensible that the experiments detailed in this memoir will prove valuable as contributing to a fuller understanding of the effects upon the human system of the different articles of food used, and as indicating the value of these substances as aliments.

The investigations were all instituted upon myself. During their continuance, no other food than that experimented with was taken into the system. An interval sufficient to restore the organism to its normal condition was suffered to elapse after each series, before the following one was commenced. During this interval, I lived upon a full and nutritious diet, and endeavored so to arrange the ingesta as to supply the economy with those substances which it most needed.

My usual manner of living, during each of the succeeding series of experiments, was as follows:—

I arose from bed at 6½ A. M., and retired at 10½ P. M. Eight hours of the twenty-four were accordingly passed in inactivity, the remaining sixteen were apportioned in the following manner. Eight were occupied in conducting the necessary analyses, and in other work of the laboratory; four were given to chemical and physiological studies; and four were taken up with the duties of

ry profession, physical exercise, recreation, &c. The exercise was uite limited, consisting of walking about one thousand yards per ay. Each period of twenty-four hours is reckoned from 7 A. M. o the same hour the ensuing morning.

The following determinations of the egesta were made for each eriod of twenty-four hours as above defined:—

I. The quantity of urine.
   - A. Water.
   - B. Solids.
     - *a.* Urea.
     - *b.* Uric acid.
     - *c.* Chlorine.
     - *d.* Sulphuric acid.
     - *e.* Phosphoric acid.
     - *f.* Residue of solid matter.

II. The quantity of feces.
   - A. Water.
   - B. Solids.
     - *a.* Ether extract.
     - *b.* Alcohol extract.
     - *c.* Water extract.
     - *d.* Insoluble residue.

III. The amount of cutaneous and pulmonary transpirations (calculated).

Besides these observations on the egesta, the weight of the body was ascertained at the close of each period. Observations were also made of the state of the pulse, and the temperature of the body, three times during the day. The latter was always determined in a room, the temperature of which was 60° F., by placing a delicate thermometer under the tongue.

The height of the barometer and thermometer (mean of three observations) is also given for each day.

On the first and last day of each series of researches, an analysis of the blood was made.

In addition to the above, microscopical and chemical examinations of the saliva, urine, and feces, were often made, which are not referred to, unless unusual results were obtained. Thus, the reaction of the saliva was always determined, but is not mentioned, unless it differed from the normal condition by being neutral, or

acid. The reaction of the urine and fæces is not stated, unless it was neutral or alkaline—these excretions being usually acid. The urine was also frequently tested for the presence of albumen and sugar, and submitted to microscopical examination. The fæces were likewise often examined with the microscope.

In performing the requisite analysis, I made use of the following methods. It will be seen that, wherever it was practicable, the volumetric process was employed. This was done, not only because it yields more accurate results than the method of precipitating and weighing, but also because it is more easy of execution and requires less time. I have merely indicated the special methods without going into detailed descriptions of them.[1]

Urine.—The whole quantity of this excretion for the twenty-four hours was accurately weighed.

The water and solids were estimated by evaporating to as perfect dryness as possible, over sulphuric acid, in the vacuum of an air-pump, a weighed portion of the whole quantity of urine passed in twenty-four hours. The loss of weight indicated the amount of water, and the weight of the residue, the quantity of solid matter contained in this portion. By simple calculation, these were found for the total amount of urine evacuated during the day. This process is open to the objection, that it is impracticable by it to deprive the specimen of urine of all its water. The quantity of this latter remaining, when a good vacuum is kept up, is, however, very small, and, upon the whole, the results obtained are more exact than when evaporation by heat is practised, as the decomposition of the urine, which always attends this latter process, is entirely avoided.

The *urea* was determined by a titrited solution of the nitrate of mercury, as originally proposed by Liebig.

The *uric acid*, by precipitation with hydrochloric acid from a known quantity of the urine, and subsequent weighing.

The *chlorine*, by Liebig's method with the nitrate of mercury.

The *sulphuric acid*, by a titrited solution of chloride of barium.

The *phosphoric acid*, by Liebig's process with a titrited solution of perchloride of iron.

[1] For full accounts of all the analytical processes made use of in these experiments, and for much other information valuable to those engaged in physiologico-chemical investigations, the reader is referred to Von Gorup-Besanez' Anleitung zur zoochemischen Analyse, a work which has not yet found its counterpart in the English language.

The *residue of solid matter* was found by deducting the sum of the above constituents from the total amount of solids.

Feces.—The whole quantity of the twenty-four hours was first accurately weighed.

The *water* and *solids* were determined by taking a known weight of the feces (when more than one stool occurred in the twenty-four hours these were previously well mixed), and evaporating it to dryness in a chloride of calcium bath at a temperature of 220° F., till upon repeated trials it ceased to lose weight. The loss showed the proportion of water, and the weight of the dry residue that of the solids in the portion submitted to examination. The amount of each in the whole quantity of feces was then calculated from these data.

The *ether*, *alcohol*, and *water extracts*, were severally determined as follows:—

A weighed quantity of the dry feces, obtained as above described, was, in the first place, exhausted with ether in Von Bibra's apparatus. The residue was then treated with alcohol of .83 specific gravity, till this substance failed to extract anything more. The substance remaining was then submitted to the action of distilled water, till it was thoroughly exhausted. The extracts obtained by these means were then evaporated, dried at the temperature proper for each, weighed, and the quantity of each in the whole amount of dry feces calculated. The sum of the whole quantity of these extracts, deducted from the whole amount of dry feces, gave the insoluble residue.

The amount of loss from the skin and lungs, collectively, was found, when the body lost weight, by adding the amount of loss to the sum of the ingesta, and subtracting from the aggregate the sum of the excretions from the kidneys and intestines. When the body gained weight, the amount of gain was subtracted from the sum of the ingesta, and the sum of the known egesta deducted as before. The result, in either case, was the loss from the skin and lungs.

The weight of the body was determined by a balance capable of turning with the hundredth of a pound, when loaded with 250 pounds.

In the analysis of the blood, I made use of Scherer's method, which embraces the determination of the *water*, *solids*, *albumen*, *extractive*, and *salts* of the *serum separately*, and the *water*, *solids*, *fibrin*, *blood-corpuscles*, *albumen*, *extractive*, *salts*, and *fat*, of the *blood as a whole*. Scherer's process, though not altogether free from ob-

jection, is pronounced by Professor Lehmann to be the best we at present possess.

The microscope employed in these researches was a very fine one of Powell and Lealand's construction, with object glasses ranging from 1 to $\frac{1}{8}$ inch focal distance.

It is proper that I should state, that I am 28½ years of age, 6 feet 2 inches in height, and measure 38½ inches around the most prominent part of the chest. My weight during the last three years has ranged from 215 to 230 pounds. My habit of body is rather full, temperament sanguineo-nervous. I am of sedentary habits, rarely taking much physical exercise, unless with some specific object in view other than the exercise. I have never indulged freely in alcoholic liquors, and very seldom use them now; tobacco I do not use in any form. For the last three years my health has been excellent. For a year previous to this period, I was troubled with symptoms indicative of disease of the heart, but no organic affection could be discovered on thorough examination, and by care and change of air, I entirely recovered. At the time of commencing these experiments my health was never better.

In order to show the usual condition of my system, and of the several excretions, and thus to afford data on which to base a more correct estimate of the effects of the several articles of food experimented with than could otherwise be formed, I instituted upon myself a preliminary series of investigations, the details of which are here stated.

During this prefatory series of researches, I ate such articles of food as my appetite called for. It was, as I found by experience, almost impossible to measure the quantities of the different alimentary substances ingested, when, as in this instance, no fixed rule of diet was adopted. The liquids, however, were susceptible of easy approximate determination, and the quantities of these are accordingly stated.

The apportionment of the day, as regarded mental and physical exercise, recreation, sleep, &c., was the same as previously stated, and the conditions generally as arranged for the main subjects of inquiry were not materially altered.

In this, and in each of the succeeding series of experiments, all figures expressive of the quantities of the ingesta, egesta, and con-

[1] Physiological Chemistry, vol. i. p. 593 (Am. ed.).

stituents of the latter, refer to Troy grains. The weight of the body is given in pounds and hundredths Avoirdupois.[1]

This series continued five days. As the total weight of the daily ingesta was not determined, no measurement of the loss from the skin and lungs could be made in these investigations.

FIRST DAY.

INGESTA.

Breakfast; hot bread and butter, and beefsteaks. *Luncheon;* cold beef, and bread and butter. *Dinner;* beef soup, roast beef, potatoes, maccaroni, and custard. During the day drank 4420 grains coffee, and 17250 water.

EGESTA.

Kidneys.

Whole quantity of urine 20258.68.

Water	19185.48	
Solids	1073.20	
Urea		628.85
Uric acid		13.27
Chlorine		124.50
Sulphuric acid		45.86
Phosphoric acid		60.13
Residue		210.59

Intestines.

Whole quantity of feces 2310.47.

Water	1702.37	
Solids	608.10	
Ether extract		75.94
Alcohol extract		111.38
Water extract		128.32
Insoluble residue		292.36

My pulse was at 7 A.M. 85 per minute, at 2 P.M. 88, and at 10 P.M. 80.—Mean 84.33.

The temperature of the body at the same hours was respectively 97.5°, 98°, and 98°.—Mean 97.83°.

At 3 P.M. 1525.73 grains of blood were drawn from the median

[1] The pound, Avoirdupois, is equivalent to 7000 grains Troy. The hundredth is consequently 70 grains Troy.

basilic vein. This, upon analysis, was found to be constituted as follows:—

1000 parts of serum—		1000 parts of blood—	
Water	908.42	Water	780.29
Solids	91.58	Solids	219.71
Albumen	76.18	Fibrin	2.4
Extractive	4.27	Blood corpuscles	143.19
Soluble salts	10.22	Albumen	65.43
	90.67	Extractive	4.02
Difference	.91	Soluble salts	9.11
			224.15
		Difference	4.36

In 1000 parts of serum were contained 11.92 of inorganic salts.

The whole quantity of inorganic salts in 1000 parts of blood was 11.68. In 1000 parts defibrinated blood were 2.34 fat.

The weight of the body at the end of the twenty-four hours was 226.45 pounds. The mean height of the barometer was 29.211 inches, and of the thermometer 43°.

SECOND DAY.

INGESTA.

Breakfast; buckwheat cakes and butter, broiled ham, boiled eggs. *Luncheon;* cold ham and bread and butter. *Dinner;* beef soup, roast beef, potatoes and beets. Drank 5000 grains of coffee, and 18200 water.

EGESTA.

Kidneys.

Whole quantity of urine 22756.37.

Water	21488.15	
Solids	1286.22	
Urea		790.11
Uric acid		10.58
Chlorine		151.28
Sulphuric acid		50.72
Phosphoric acid		66.13
Residue		199.40

Intestines.

Whole quantity of feces 2445.69.

Water	1681.68
Solids	764.01

Ether extract	142.40
Alcohol extract	125.18
Water extract	202.41
Insoluble residue	294.02

At 7 A.M. my pulse was 82, at 2 P.M. 90, and at 10 P.M. 83.—Mean 85.

At the same periods, the temperature of the body was respectively 98°, 98.5°, and 98.5°.—Mean 98.33°.

At the end of the twenty-four hours my weight was 226.52 pounds; showing an increase of .07 pound, or 490 grains.

The mean height of the barometer was 29.341 inches, of the thermometer 46°.

The quantity of food ingested on this day was somewhat greater than usual. Towards evening I had slight headache, which, however, disappeared before bedtime; slept well.

THIRD DAY.

INGESTA.

Breakfast; hot bread and butter, and beefsteak. *Luncheon;* cold ham, and bread and butter. *Dinner;* beef soup, roast chicken, potatoes and cabbage, rice pudding, with wine sauce. Drank in the twenty-four hours 4250 grains of coffee, and 23500 water.

EGESTA.

Kidneys.

Whole quantity of urine 21250.17.

Water	20224.47	
Solids	1025.70	
Urea		620.50
Uric acid		11.57
Chlorine		142.19
Sulphuric acid		35.71
Phosphoric acid		47.31
Residue		168.42

Intestines.

Whole quantity of feces 2041.76.

Water	1537.63	
Solids	504.13	
Ether extract		89.14
Alcohol extract		95.17
Water extract		112.35
Insoluble residue		207.47

The pulse at 7 A.M. was 81, at 2 P.M. 86, and at 10 P.M. 84.—Mean 83.66.

The temperature of the body at the corresponding hours was respectively 98°, 98.5°, and 97.5°.—Mean 98°.

At the end of the day the weight of the body was 226.5 pounds; a loss from the previous day of .10 pound, equivalent to 700 grains.

The mean height of the barometer was 29.241 inches, and of the thermometer 41°.

FOURTH DAY.

INGESTA.

Breakfast; hot bread and butter, and beef hash, highly seasoned. *Luncheon;* cold beef tongue, and bread and butter. *Dinner;* stewed beef, potatoes, maccaroni, and blanc-mange; ate also a supper at 10 P.M. of oysters (preserved in hermetically sealed cans), and bread and butter. Drank in the twenty-four hours 5000 grains of coffee, and 21500 water.

EGESTA.

Kidneys.

Whole quantity of urine 20523.45.

Water	19388.27	
Solids	1134.18	
Urea		710.62
Uric acid		10.91
Chlorine		131.46
Sulphuric acid		44.32
Phosphoric acid		53.87
Residue		183.00

Intestines.

Whole quantity of feces 2204.11.

Water	1472.89	
Solids	731.22	
Ether extract		60.39
Alcohol extract		67.48
Water extract		106.17
Insoluble residue		497.18

At 7 A.M. my pulse was 81, at 2 P.M. 84, and at 10 P.M. 82.—Mean 82.33.

At the same hours the temperature of the body was respectively 97°, 97.5°, and 98°.—Mean 97.50°.

The weight of the body at the end of the twenty-four hours was 226.50 pounds; an increase of .08 pound, equivalent to 560 grains.

The height of the barometer was 28.965 inches, and of the thermometer 40°.

FIFTH DAY.

INGESTA.

Breakfast; hot buckwheat cakes and butter, and beefsteak. *Luncheon;* cold ham, and bread and butter. *Dinner;* beef soup, roast venison, potatoes, cabbage, and maccaroni, preserved citron-melon, and milk. During the day drank 4800 grains of coffee, and 20200 water.

EGESTA.

Kidneys.

Whole quantity of urine 19634.92.

Water	18698.29	
Solids	986.63	
Urea		521.75
Uric acid		12.02
Chlorine		141.26
Sulphuric acid		49.30
Phosphoric acid		51.84
Residue		210.46

Intestines.

Whole quantity of feces 2467.58.

Water	1975.41	
Solids	492.17	
Ether extract		85.14
Alcohol extract		83.60
Water extract		98.52
Insoluble residue		224.91

My pulse at 7 A.M. was 83, at 2 P.M. 88, and at 10 P.M. 85.—Mean 85.33.

The temperature of the body at the same periods was respectively 98°, 98.5°, and 97.5°.—Mean 98°.

At 3 P.M. I abstracted 1293.25 grains of blood from the median

basilic vein, which, upon analysis, was found to possess the following constitution:—

1000 parts of serum—	
Water	909.57
Solids	90.43
Albumen	72.21
Extractive	5.32
Soluble salts	12.14
	89.67
Difference	.76

The total amount of inorganic salts in 1000 parts of serum was 14.39

1000 parts of blood—	
Water	782.46
Solids	217.54
Fibrin	2.36
Blood-corpuscles	141.25
Albumen	62.10
Extractive	4.25
Soluble salts	11.40
	221.36
Difference	3.82

The total amount of inorganic salts in 1000 parts of blood was 13.75. In 1000 parts of defibrinated blood were 2.7 of fat.

The weight of the body at the close of the twenty-four hours was 226.41 pounds; a loss of .09 pound, or 630 grains.

The mean height of the barometer was 29.042 inches, and of the thermometer 45°.

The following table exhibits the foregoing results in a collected form.

TABLE I.

EGESTA.	1st day.	2d day.	3d day.	4th day.	5th day.	Total.	Mean.
Kidneys—							
Urine	20258.68	22756.37	21250.17	20523.45	19684.92	104493.59	20898.71
Water	19185.48	21485.15	20224.47	19388.27	18698.29	99005.66	19801.13
Solids	1073.20	1268.22	1025.17	1134.18	986.63	5487.93	1097.58
Urea	628.85	790.11	620.50	710.62	521.75	3471.83	694.36
Uric acid	13.27	10.55	11.57	10.91	12.02	58.35	11.67
Chlorine	124.50	151.28	142.19	131.46	141.26	690.69	138 13
Sulphuric acid	45.86	50.72	35.71	44.32	49.30	225.91	45.18
Phosphoric acid	60.13	66.13	47.31	53.87	51.84	229.28	55.85
Residue	210.59	199.40	168.42	183.00	210.46	971.87	194.37
Intestines—							
Feces	2310.47	2445.69	2041.76	2204.11	2467.58	11469 61	2293.92
Water	1702.37	1681.68	1537.63	1472.89	1975.41	8369.98	1673.99
Solids	608.10	764.01	504.13	731.22	492.17	3099.63	619.92
Ether extract	75.94	142.40	89.14	60.39	85.14	453.01	90.60
Alcohol extract	111.38	125.18	95.17	67.48	83.60	482.81	95.56
Water extract	128.32	202.41	112.35	106.17	98.52	647.77	129.55
Insoluble residue	292.36	294.02	207.47	497.18	224.91	1575.94	303.18
Weight of body	226.45	226.52	226.42	226.50	226.41	...	226.46
Pulse	84.33	85.00	83.66	82.83	85.33	...	84.23
Temperature of body	97.83°	98.33°	98°	97.50°	97.50°	...	97.83°
Barometer	...	...	...	...	...	...	...
Thermometer	...	...	...	...	...	...	...

I now proceed to consider the main subjects of investigation, regretting, however, that they are not treated in a more complete manner, but indulging the hope, that the time and labor I have bestowed upon them may not prove altogether without profit to physiological science, and that others more learned and with greater facilities at their command, will labor to dispel the darkness which yet obscures so many of the vital processes.

EXPERIMENTAL RESEARCHES.

I.

ALBUMEN.

It is an established fact in physiology, that nitrogen is essential to the formation of all the organized tissues of the body. The experiments of Regnault and Reiset[1] have definitely determined, what had previously been arrived at by Boussingault[2] in another way, that this substance is not absorbed into the system from the atmosphere by respiration, but that there is actually, on the contrary, a loss of nitrogen to the organism from the lungs. It must, therefore, be entirely derived from the alimentary substances ingested into the stomach.

It results, therefore, that food, to be fully available for the requirements of life, must contain nitrogen in its composition, and it was, until recently, contended by many physiologists, that the nutritive value of aliments was to be directly measured by the proportion of this element entering into their constitution. It is now, however, generally admitted, that in order to conduce to the nutrition of the tissues, the nitrogen must be introduced in the form of protein.

The proteinaceous compounds ordinarily met with in the food of man, are albumen, fibrin, casein, vitellin, gluten, and legumin. The first four of these are found in animal, the latter two in vegetable food. Both the organic kingdoms of nature thus unite in providing substances containing protein, and, accordingly, whether we consider the purely carnivorous or herbivorous animal, we find

[1] Researches chimiques sur la respiration. Paris, 1849.

[2] Mémoires de chimie agricole et de physiologie. Paris, 1854, pp. 1–47. First published in Ann. de Chim. et de Phys.

that each is furnished with aliment containing a sufficiency of nitrogen to serve all the purposes of its organism.

Though the protein aliments are of such great value as organoplastic materials, it would appear, judging from experiments upon the inferior animals, that life cannot be sustained for any considerable period upon either of them alone. Tiedemann and Gmelin found it impossible to support life in geese which they fed upon pure white of egg, and the researches of other physiologists have yielded similar results. The main difficulty appears to have been, the inability of the digestive organs of the animals submitted to experiment, to assimilate a sufficient quantity of a protein compound to afford enough carbon to compensate for the loss of this substance from the lungs. Thus, Boussingault[1] fed ducks exclusively upon albumen, casein, and fibrin, and invariably found this to be the case. Too much importance, however, should not be attached to experiments of this nature. Various temporary causes affecting the solubility of the food may have existed, and great care should be exercised, before deducing inferences, and applying them to man, from investigations instituted on the lower animals. The theory (based as it is, solely in experiments upon animals far lower in the scale of creation than man), that the digestive fluids can only dissolve a limited amount of an albuminate in a given time, and that this quantity is insufficient for the demands of the system, is far from established, and has been in a great measure disproved by the recent observations of Jones.[2]

Though differing in physical characteristics, the proteinaceous substances are probably identical in chemical constitution. Albumen, the most important of them, may be regarded as the representative of the class. It is one of the chief organic constituents of the chyle and blood, from which all the tissues are elaborated, and no doubt exists that, by some means or other, the remaining members of the group, when taken into the stomach, undergo conversion into it. I have, therefore, selected it for experiment in preference to either of the others.

The investigations into the value of albumen as an article of food, and its effects upon the system, continued ten days. During this period, no other solid food was taken into the stomach, and no liquid but water. The albumen used was obtained from the serum

[1] Op. cit., p. 233, et seq.

[2] Digestion of Albumen and Flesh, &c.—*Medical Examiner*, 1856, p. 257.

of bullock's blood, by boiling it, and was consequently ingested in the coagulated form. This was the only source at my command for obtaining albumen in any quantity. It was well washed, to remove, as far as possible, all extraneous matters, and was then subjected to a temperature of 220° F., in a chloride of calcium bath, to expel all moisture. The water drank was either distilled or obtained by melting snow. The water of this region, from the springs and streams, contains so large a proportion of salts, that, had it been used, it would have interfered materially with the results. The distilled water was always well agitated with atmospheric air before being drunk. The other conditions under which the investigations were conducted, have been fully stated in the Introduction, and need not, therefore, be dwelt upon here. I omitted, however, to state, that the feces were usually evacuated immediately after rising in the morning. All deviations from this rule are specially mentioned.

At the termination of the twenty-four hours, immediately preceding the commencement of the experiments, my weight was 226.51 pounds.

FIRST DAY.

INGESTA.

8 A.M.	Albumen	2980	Water	7528
1 P.M.	"	2562	"	6350
5 "	"	3187	"	9580
Total	"	8729	"	23458

EGESTA.

Kidneys.

Whole quantity of urine 16520.36.

Water	15363.07	
Solids	1157.29	
Urea		812.16
Uric acid		21.39
Chlorine		30.54
Sulphuric acid		28.65
Phosphoric acid		36.17
Residue		238.38

Intestines.

Whole quantity of feces 1251.70.

Water	943.41
Solids	308.29

Ether extract	26.25
Alcohol extract	89.74
Water extract	125.18
Insoluble residue . . .	67.23

Skin and Lungs.

Total loss through these channels 15059.14.

The pulse at 7 A.M. was 82, at 2 P.M. 84, and at 10 P.M. 86.—Mean 84.

The temperature of the body at the corresponding hours was respectively 96.5°, 97°, and 98.5°.—Mean 97.33°.

At 3 P.M. I abstracted 1525.80 grains of blood from the median basilic vein, which, upon analysis, was found to possess the following composition:—

1000 parts of serum—		1000 parts of blood—	
Water . . .	906.28	Water . . .	776.45
Solids . . .	93.72	Solids . . .	223.55
Albumen . . .	78.21	Fibrin . . .	2.65
Extractive . . .	6.03	Blood corpuscles .	142.09
Soluble salts . . .	8.34	Albumen . . .	67.00
	92.68	Extractive . . .	5.11
Difference . . .	1.04	Insoluble salts . .	6.37
			223.22
		Difference . . .	.33

The whole quantity of inorganic salts in 1000 parts of serum was 10.29.

The whole quantity of inorganic salts in 1000 parts of blood was 7.93. In 1000 parts of defibrinated blood were 2.39 of fat.

The weight of the body at the close of the twenty-four hours was 226.20 pounds; a loss, therefore, of .31 pound, equivalent to 2170 grains, of which 1525.80 are accounted for by the blood drawn for analysis leaving 644.20 grains as the actual loss from the excretions.

The mean height of the barometer was 29.277 inches, and of the thermometer 45° F.

My appetite on this day was as good as usual. The food was sufficient to satisfy it, and was by no means unpleasant to the taste. I had no disagreeable symptoms of any kind. Sleep was sound and refreshing, and the intellectual faculties clear.

SECOND DAY.

INGESTA.

8 A.M.	Albumen . . .	3250	Water . . .	8050
1 P.M.	" . . .	2428	" . . .	7525
5 "	" . . .	2975	" . . .	9200
Total	" . . .	8653	" . . .	24775

EGESTA.

Kidneys.

Whole quantity of urine 16937.62.

Water	15687.44	
Solids	1250.18	
Urea		922.39
Uric acid		22.47
Chlorine		21.54
Sulphuric acid		23.65
Phosphoric acid . . .		34.17
Residue		225.96

Intestines.

Whole quantity of feces 1353.69.

Water	1070.94	
Solids	282.75	
Ether extract		18.20
Alcohol extract . . .		75.32
Water extract		124.10
Insoluble residue . . .		71.13

Skin and Lungs.

Total loss through these channels 15556.69.

The pulse at 7 A. M. was 84, at 2 P. M. 87, and at 10 P. M. 88.—Mean 86.33.

The temperature of the body at the same hours was respectively 98°, 98.5°, and 97.5°.—Mean 98°.

My weight at the end of the twenty-four hours was 226.14 pounds; being a loss from the previous day of .06 pound, or 420 grains.

The mean heights of the barometer and thermometer were respectively 29.098 inches, and 42.50°.

I had no unusual feelings of any kind on this day; slept well.

The feces were of a very dark brown color, and of neutral reac-

ion. Crystals of ammonio-magnesian phosphate, epithelial cells, and oil and mucus globules, visible with the microscope.

THIRD DAY.

INGESTA.

8 A.M.	Albumen	3760	Water	8325
1 P.M.	"	3000	"	8490
5 "	"	4525	"	8420
Total	"	11285	"	25235

EGESTA.

Kidneys.

Whole quantity of urine 18428.60.

Water	17039.02	
Solids	1389.58	
Urea		1162.39
Uric acid		28.92
Chlorine		10.45
Sulphuric acid		29.18
Phosphoric acid		48.21
Residue		110.42

Intestines.

Whole quantity of feces 1628.17.

Water	1273.91	
Solids	354.26	
Ether extract		12.40
Alcohol extract		69.27
Water extract		99.68
Insoluble residue		172.91

Skin and Lungs.

Total loss from these channels 15903.23.

My pulse was at 7 A.M. 86, at 2 P.M. 88, and at 10 P.M. 89.—Mean 87.66.

The temperature of the body at the same periods was respectively 98°, 97.5°, and 98.5°.—Mean 98°.

At the termination of the twenty-four hours my weight was 226.22 pounds; a gain over the previous day of .08 pound, or 560 grains.

The mean height of the barometer was 29.245 inches, and of the thermometer 44°.

Two evacuations of the intestinal canal occurred on this day;

one at 9 P.M., the other at the regular hour. Both were in appearance, reaction, &c., similar to the discharge of the preceding day. In the evening I had slight pains in the lower part of the abdomen, and quite severe headache. Both disappeared after the first passage from the bowels. My sleep was unquiet in the early part of the night, and I awoke in the morning with headache.

In increasing so materially the quantity of albumen ingested on this day, my main object was to test more completely the power of the digestive organs. It is seen that they were fully capable of dissolving it, and that through its assimilation, enough carbon was absorbed to supply the wants of the system. This is evidenced by the increase in the weight of the body and the augmentation in the quantity of matter eliminated through the skin and lungs.

FOURTH DAY.

INGESTA.

8 A.M.	Albumen	4200	Water	8560
1 P.M.	"	4650	"	9255
5 "	"	3875	"	6350
Total	"	12725	"	24165

EGESTA.

Kidneys.

Whole quantity of urine 17483.75.

Water	15954.25	
Solids	1429.50	
Urea		1251.32
Uric acid		27.40
Chlorine		5.37
Sulphuric acid		21.18
Phosphoric acid		22.29
Residue		101.94

Intestines.

Whole quantity of feces 1827.16.

Water	1389.73	
Solids	437.43	
Ether extract		10.36
Alcohol extract		80.29
Water extract		151.47
Insoluble residue		195.31

Skin and Lungs.

Total loss through these channels 16329.09.

At 7 A.M. my pulse was 86, at 2 P.M. 90, and at 10 P.M. 98.—Mean 91.33.

At the same hours the temperature of the body was respectively 98°, 99°, and 99.5°.—Mean 98.83.

At the end of the twenty-four hours my weight was 226.32 pounds; an increase of 0.10 pound, or 700 grains.

The mean heights of the barometer and thermometer were respectively 29.230 inches, and 47.66°.

I had severe headache the whole of this day, attended with some fever. The skin was hot and dry. My appetite was not good. After each time of ingesting the albumen there was a feeling of debility in the system, accompanied with a singular sinking sensation at the epigastrium. There was also nausea at several periods of the day. The pains in the lower part of the abdomen were very severe, especially about two hours after each meal.

The feces were similar in appearance to those of the previous day; the reaction was alkaline. Crystals of ammonio-magnesian phosphate in small quantity visible with the microscope.

The urine was of high color, and of strong acid reaction—a drop evaporated to dryness on a slip of glass and placed upon the stage of the microscope, exhibited numerous needle-shaped crystals of urea.

It is perceived from the record of these experiments, that the digestive organs were capable of dissolving the large amount of albumen ingested, and that it was fully sufficient for the support of the respiratory process, and to maintain the weight of the body. The constitutional disturbance induced, warned me, however, against a repetition of so large a quantity.

FIFTH DAY.

INGESTA.

8 A.M.	Albumen	1850	Water	8250
1 P.M.	"	2330	"	7380
5 "	"	2500	"	8650
Total	"	6680	"	24550

EGESTA.

Kidneys.

Whole quantity of urine 18738.50.

Water	17699.08
Solids	1039.42

Urea		721.26
Uric acid		18.40
Chlorine		5.01
Sulphuric acid		15.12
Phosphoric acid		17.25
Residue		262.38

Intestines.

Whole quantity of feces 1726.54.

Water	1379.30	
Solids	347.24	
Ether extract		17.29
Alcohol extract		167.52
Water extract		85.68
Insoluble residue		76.75

Skin and Lungs.

Total loss from these channels 13394.96.

At 7 A.M. my pulse was 90, at 2 P.M. 93, at 10 P.M. 104.—Mean 95.66.

At the same periods the temperature of the body was respectively 97°, 97°, and 97.5°.—Mean 97.16°.

At the end of the twenty-four hours my weight was 225.93 pounds; being a loss from the preceding day of .39 pound, equivalent to 2730 grains.

The mean height of the barometer was 29.207 inches, and of the thermometer 42.33°.

On this day I felt far from well. I had headache, and pains in the abdomen. The sinking sensation at the epigastrium was not so great as on the previous day.

Three evacuations of the bowels occurred; one at 10 A.M., one at 4 P.M., and one at 11 P.M. They were thinner, and of a darker color than previously. My physical strength was much less than usual. Appetite was not good. The sight of the albumen created disgust and nausea. Was quite restless in the night, and felt chilly towards morning. The mental faculties were not sensibly affected.

SIXTH DAY.

INGESTA.

8 A.M.	Albumen	2500		Water	7530
1 P.M.	"	1520		"	8200
5 "	"	2000		"	7550
Total	"	6020		"	23280

EGESTA.

Kidneys.

Whole quantity of urine 17530.24.

Water	16551.88	
Solids	978.36	
Urea		728.54
Uric acid		29.17
Chlorine		4.22
Sulphuric acid		12.18
Phosphoric acid		18.45
Residue		175.80

Intestines.

Whole quantity of feces 1852.15.

Water	1331.34	
Solids	520.31	
Ether extract		10.42
Alcohol extract		112.16
Water extract		136.58
Insoluble residue		261.15

Skin and Lungs.

Total loss through these channels 12927.61.

At 7 A.M. my pulse was 92, at 2 P.M. 93, and at 10 P.M. 93.—Mean 92.66.

At the same hours, the temperature of the body was respectively 96.5°, 97°, and 97.5°.—Mean 97°.

At the end of the twenty-four hours my weight was 225.50 pounds; being a loss of .43 pound, or 3010 grains.

The mean height of the barometer was 29.110 inches, and of the thermometer 42°.

I experienced on this day an increase of debility. The headache and pain in the abdomen of the preceding days were not present on this. I had very great desire for other food. The albumen was not at all relished, and it was with great effort I could bring myself to eat it. At night I slept quite well.

SEVENTH DAY.

INGESTA.

8 A.M.	Albumen . . .	3250	Water . . .	8000
1 P.M.	" . . .	4000	" . . .	8500
5 "	" . . .	3550	" . . .	7285
Total	" . .	10800	" . .	23785

EGESTA.

Kidneys.

Whole quantity of urine 16592.83.

Water	15911.08	
Solids	581.75	
Urea		390.60
Uric acid		11.28
Chlorine		3.61
Sulphuric acid		10.73
Phosphoric acid . . .		13.17
Residue		152.36

Intestines.

Whole quantity of feces 3276.40.

Water	2122.60	
Solids	1153.80	
Ether extract		11.92
Alcohol extract . . .		100.65
Water extract		75.10
Insoluble residue . . .		955.13

Skin and Lungs.

Total loss from these channels 17476.77.

My pulse was at 7 A.M. 93, at 2 P.M. 94, and at 10 P.M. 95.—Mean 94.

At the same hours the temperature of the body was respectively 97.5°, 97.5°, and 97°.—Mean 97.33°.

At the termination of the twenty-four hours my weight was 225.10 pounds; a loss, therefore, of .40 pound, equivalent to 2800 grains.

The mean height of the barometer was 29.106 inches, and of the thermometer 35.33°.

I felt weaker on this day than on any previous one of the investigations. Otherwise, I experienced no very disagreeable sensa-

tions. My skin was moist and cool during the whole day. Mental faculties active and clear.

There were two evacuations from the bowels, one at 7 P.M., the other at the usual hour. Both were of firm consistence, of the same dark-brown color, and free from strong odor. On heating a small quantity of the urine in a test tube (as had been done each day of the investigations), a precipitate, insoluble in nitric acid, ensued. This was therefore albumen.

EIGHTH DAY.

INGESTA.

8 A.M.	Albumen . . .	2980	Water . . .	7900
1 P.M.	" . . .	1855	" . . .	8280
5 "	" . . .	3740	" . . .	9525
Total	" . .	7575	" . .	25705

EGESTA.

Kidneys.

Whole quantity of urine 21235.18.

Water	20407.96	
Solids	827.22	
Urea		492.20
Uric acid		18.49
Chlorine		3.35
Sulphuric acid		11.24
Phosphoric acid . . .		11.08
Residue		290.86

Intestines.

Whole quantity of feces 3684.02.

Water	2373.10	
Solids	1310.92	
Ether extract		8.01
Alcohol extract . . .		105.27
Water extract		122.53
Insoluble residue . . .		1075.11

Skin and Lungs.

Total loss from these channels 12770.80.

At 7 A.M. my pulse was 92, at 2 P.M. 91, and at 10 P.M. 89.—Mean 90.66.

The temperature of the body at the same hours was respectively 97°, 96.5°, and 96°.—Mean 96.50°.

My weight at the end of the twenty-four hours was 224.7 pounds; being a decrease of .63 pound, equivalent to 4410 grains.

The mean heights of the barometer and thermometer were respectively 29.289 inches, and 35.33°.

With the exception of the debility, I felt tolerably well on this day. I did not, however, read or study any, and took no physical exercise beyond walking a few steps.

Two operations of the bowels occurred, one at 6 P. M., and the other at the usual hour. The feces were quite hard and similar in color and odor to those of the preceding days.

Albumen was precipitated from the urine by heat. The quantity was considerable.

NINTH DAY.

INGESTA.

8 A.M.	Albumen	2150	Water	5250
1 P.M.	"	2200	"	5690
5 "	"	1800	"	6000
Total	"	6150	"	16940

EGESTA.

Kidneys.

Whole quantity of urine 12325.10.

Water	11674.86	
Solids	650.24	
Urea		329.75
Uric acid		14.81
Chlorine		2.39
Sulphuric acid		8 96
Phosphoric acid		10.53
Residue		283.80

Intestines.

Whole quantity of feces 8726.50.

Water	8106.35	
Solids	620.15	
Ether extract		11.24
Alcohol extract		162.95
Water extract		50.17
Insoluble residue		395.79

Skin and Lungs.

Total loss from these sources 10018.40.

My pulse at 7 A.M. was 96, at 2 P.M. 98, and at 10 P.M. 104.—Mean 99.33.

At the same hours, the temperature of the body was respectively 96°, 96.5°, and 97°.—Mean 96.50°.

The weight of the body at the close of the twenty-four hours was 223.33 pounds; a loss of 1.14 pound, or 7980 grains.

The mean height of the barometer for the day was 29.235 inches, and of the thermometer 24.33°.

A serious diarrhœa of considerable violence commenced on this day. I had six evacuations of the intestines. The discharges were very thin, of a dark-brown color, and faint odor. The debility was much increased. There was dryness of the skin, and the urine was of high color. An increased amount of albumen was present in this latter excretion. My appetite was not good, neither was there much thirst. Mind clear, sleep very unquiet.

TENTH DAY.

INGESTA.

8 A.M.	Albumen	1785	Water	9620
1 P.M.	"	1530	"	8900
5 "	"	1500	"	9050
10 "	"	——	"	6525
Total	"	4815	"	34095

EGESTA.

Kidneys.

Whole quantity of urine 21592.87.

Water	20907.63	
Solids	685.24	
Urea		340.29
Uric acid		15.31
Chlorine		2.12
Sulphuric acid		8.36
Phosphoric acid		9.15
Residue		310.01

Intestines.

Whole quantity of feces 10257.30.

Water	9692.90
Solids	565.10

Ether extract	10.46
Alcohol extract . . .	182.63
Water extract	530.5
Insoluble residue . . .	318.96

Skin and Lungs.

Total loss through these sources 15319.83.

At 7 A.M. my pulse was 94, at 2 P.M. 98, and at 10 P.M. 98.—Mean 96.66.

The temperature of the body at the same hours was respectively 96.5°, 97.5°, and 98°.—Mean 97.33°.

At 3 P.M. I abstracted 1330 grains of blood from the median basilic vein. An analysis yielded the following results:—

1000 parts of serum—		1000 parts of blood—	
Water . . .	900.09	Water . . .	773.43
Solids . . .	99.91	Solids . . .	226.55
Albumen . .	83.21	Fibrin . . .	3.18
Extractive . .	12.57	Blood-corpuscles .	137.10
Soluble salts . .	3.12	Albumen . .	71.50
	98.88	Extractive . .	11.29
Difference . . .	1.03	Soluble salts . .	2.14
			225.21
		Difference . .	1.34

The whole quantity of inorganic salts in 1000 parts of serum was 4.38.

The whole quantity of inorganic salts in 1000 parts of blood was 3.90. 1000 parts of defibrinated blood contained .74 of fat.

My weight at the termination of the twenty-four hours was 221.96 pounds; being a loss from the preceding day of 1.37 pound, or 9590 grains. Of this amount 1330 are accounted for by the blood abstracted for analysis, leaving 8260 as the loss by the excretions.

The mean height of the barometer was 28.593 inches, of the thermometer 45.66°.

The diarrhœa continued on this day with increased violence. I had eight evacuations of the same character as on the previous day. There was very little mucus contained in them, and no blood. A microscopical examination revealed the presence of cylindrical and scaly epithelium in considerable quantity.

The debility on this day was extreme, and I was obliged to lie down the greater portion of it. The intellectual faculties were somewhat confused. My sleep was restless.

The urine contained a large amount of albumen.

The investigations into the value and effects of albumen were now concluded. In a few days, under a proper diet, I began to recover my usual health. The diarrhœa ceased spontaneously on the third day. The albumen disappeared from the urine the second day after the termination of the experiments.

The results of the foregoing researches are contained in the accompanying consolidated table.

TABLE II.

	1st day.	2d day.	3d day.	4th day.	5th day.	6th day	7th day.	8th day.	9th day.	10th day.	Total.	Mean.
INGESTA.												
Albumen	8729	8633	11285	12723	6680	6020	10800	7575	6150	4815	83432	8343.20
Water	23458	24775	25235	24163	24550	23280	23785	25705	16940	34095	245988	24598 80
Total	32187	33428	36520	36890	31230	29300	34585	33280	23090	38910	329420	32942.00
EGESTA.												
Kidneys—												
Whole quantity of urine	16520.36	16937.62	18428.60	17483.75	18738.50	17390.24	16592.83	21235 18	12325.10	21592.87	177385.05	17738.50
Water	15363 07	15687.44	17039.02	15954.23	17699.08	16451.88	15911.08	20407 96	11674.86	20907.63	167196.27	16019.62
Solids	1157.29	1250.18	1389.58	1429.50	1039.42	978.36	681.75	827 22	650.24	683.24	9988.78	998.87
Urea	812.16	922.39	1162.39	1241.32	721.26	728.54	390.60	492.20	329.73	340.29	7130.90	713.09
Uric acid	21.39	22.47	28.92	27.40	18.40	29.17	11 28	18 49	14.81	15.31	207.64	20.76
Chlorine	30.54	21.54	10.45	5.37	5.01	4.22	3.61	3.35	2.39	2 12	88 60	8.86
Sulphuric acid	28.65	23.65	29.18	21.18	15.12	12.18	10.73	11.24	8 96	8 36	169.25	16.92
Phosphoric acid	36.17	34.17	48.21	22.29	17.23	18.45	13.17	11 08	10.52	9.15	220.47	22.04
Residue	238.38	225.96	110.42	101.94	262.38	175.80	152.36	290.86	283.80	310.01	2151.91	215 19
Intestines—												
Whole quantity of feces	1251.70	1333.69	1628.17	1827.16	1726.54	1832.15	3276.40	3694.02	8726.50	10237.30	35583.63	3558.36
Water	943.41	1070.94	1273 91	1339.73	1379.30	1331.34	2122.60	2373.10	8106.35	9892.90	29683.55	2968.35
Solids	308 29	262.75	354.26	487.43	347.24	520.31	1153.80	1310.92	620.15	663.10	5900.25	590.02
Ether extract	26.25	18.20	12.40	10.36	17.29	10.42	11.92	8.01	11.24	10.46	136.55	13.65
Alcohol extract	89.74	75.32	69.27	80.29	167.52	112.16	100.65	105 27	162.95	182.63	1145.80	114.58
Water extract	125.18	124.10	99.68	131 47	85 68	136.58	75.10	122.53	50 17	53.05	1023.54	102.35
Insoluble residue	67.23	71.13	172.91	195.31	76.73	261.15	955.13	1075.11	395.79	318.96	3589.47	358.94
Skin and Lungs—												
Total loss from	15039.14	15356.69	15903.23	16329.09	13394.96	12927.61	17476.77	12770 80	10018.40	15819.83	144736.52	14473.65
Total egesta	32831.20	33848.00	35960.00	36190.00	33960.00	32310.00	37385.00	37690.00	31070.00	47170.00	338414.20	33841.42
Variation in weight	—644.20	—420.00	+560.00	+700.00	—2730.00	—3010.00	—2800.00	—4410.00	—7980.00	—8260.00	..	—28994.20
Pulse	84	86.33	87.66	91.33	95.66	92.66	94.00	90.66	99.33	96.66	..	91.83
Temperature of body	97.33°	98°	98°	98.83°	97.16°	97°	97.33°	96.50°	96.50°	97.33°	..	97.30°
Barometer	29.277	29.098	29.245	29.230	29.207	29.110	29.106	27.289	29.235	28.903	..	29.139
Thermometer	43°	42.50°	44°	47.66°	42.33°	42°	35.33°	35.33°	24.33°	45.66°	..	40.11°

Upon a consideration of the results of the foregoing investigations, and comparing them as far as possible with those obtained whilst I was living on a normal and ordinary diet, it is seen that the following effects in the mean ensued:—

Kidneys.—The *whole quantity of urine* was lessened, as were also the absolute amounts of *water* and *solids*. Relatively, the solids were increased in quantity. The urine was, therefore, more concentrated.

The quantity of *urea* was increased, though not so much so in the mean as was to have been anticipated.

The amount of *uric acid* eliminated was very much increased.

The proportion of *chlorine* was greatly reduced.

The *sulphuric* and *phosphoric acids* were lessened in quantity.

The *residue* was increased in amount.

Intestines.—The *whole quantity of feces* was augmented. This result was entirely due to the diarrhœa of the 9th and 10th days. More than half of the whole amount of feces was passed on these days. Throwing them out of the calculation, and it is seen that the mean quantity of feces for the remaining eight days was less than the mean of the five days of the standard series.

The *water* of the feces was greatly increased. This was owing to the same cause as the augmentation of the whole quantity of feces.

The *solids* were reduced in amount.

The *ether extract* was much lessened. It is seen, however, that there was a considerable quantity, notwithstanding no fat was ingested.

The *alcohol extract* was rendered greater in amount.

The *water extract* was diminished in quantity.

The *insoluble residue* was increased.

Skin and Lungs.—No comparison of the losses from these channels during the two series of investigations can be made; as, in the first series, they were not determined. It is perceived, however, that the general effect of increasing the amount of albumen ingested, was to augment the proportion of loss from these sources.

The *weight of the body* is seen in the mean to have materially declined.

The *pulse* was increased in frequency.

The *temperature of the body* was slightly reduced.

The effects of an exclusively albuminous diet upon the consti-

tution of the *blood*, will be more clearly perceived from the following table of the first and tenth days' analysis:—

TABLE III.

1000 parts of serum—	1st day.	10th day.	1000 parts of blood—	1st day.	10th day.
Water	906.28	900.09	Water	776.45	773.6
Solids	93.72	99.91	Solids	223.55	226.3
Albumen	78.28	83.21	Fibrin	2.65	3.1
Extractive . . .	6.03	12.57	Blood-corpuscles .	142.09	137.1
Soluble salts . .	8.34	3.12	Albumen	67.00	71.9
			Extractive . . .	5.11	11.2
Whole quant. inorg. salts	10.29	4.38	Soluble salts . . .	6.37	2.1
			Whole quant. inorg. salts	7.93	3.5
			Fat in 1000 parts defibrinated blood	2.39	.7

From this table it is perceived, that under the diet of albumen the *water*, *soluble* and *whole quantity* of *inorganic salts* of the *serum* were diminished, and the *solids*, *albumen*, and *extractive* increased in quantity. In the *whole blood* there was a diminution of the *water*, *blood-corpuscles*, *soluble* and *total amount* of *inorganic salts*, and *fat*, whilst there was an augmentation of the *solids*, *fibrin*, *albumen*, and *extractive*.

The main results of the foregoing investigations I propose to consider more at length under the following heads:—

1. The capability of the digestive organs to dissolve and the absorbents to assimilate, a sufficient quantity of albumen to support the calorifacient process.

2. The relation which the nitrogen of the urea and uric acid excreted, bears to the amount absorbed with the albumen.

In relation to the first head, physiologists are not disposed to accord a high value to albumen as an article of respiratory food. The elementary analysis of albumen shows that it does not contain all those substances which enter into the composition of the tissues of the body. It cannot, therefore, of itself, support life or health. and the functional derangements which attended its use during the foregoing investigations, abundantly establish this fact. I am very far, therefore, from claiming for it any such power. Nevertheless, I think it is fully proven, that before the general health becomes injured by a too long exclusive use of albumen, enough of this substance can be assimilated to repair the waste of the tissues, and support the respiratory function.

According to Liebig,[1] an adult man daily consumes $13\frac{9}{10}$ ounces (a little over 6000 grains) of carbon, which passes from the system by the lungs and skin as carbonic acid gas. Scharling[2] states, as the result of his researches, that a powerful adult man exhales from the lungs 867 grammes (about 13,438 grains) of carbonic acid daily. This quantity of carbonic acid is equivalent to 3664.90 grains of carbon. According to Andral and Gavarret,[3] a man twenty-six years of age exhales daily 4065 grains of carbon. Carpenter[4] is of the opinion that 3840 grains is the average daily amount of carbon given off through the lungs of a well-grown adult man.

From a series of researches instituted upon myself, with the object of ascertaining the effects of alcohol and tobacco upon the human system, I found that an average of 11674.98 grains of carbonic acid (equivalent to 3185.44 grains of carbon) were daily exhaled from the lungs. The method of determination was, however, imperfect, and the absolute amount was doubtless greater than is stated.

The preceding experiments with albumen show, that on the first and second days of the series, the body slightly decreased in weight, and that on the third and fourth days a small increase ensued. On these days, the quantity of albumen ingested was greater than on the first two days; and, that an increased amount was assimilated is evident from the comparatively small quantities of water extract and insoluble residue obtained from the feces. The fact that the bowels were regularly evacuated, shows that the increase of weight observed was not due to any obstruction of the intestinal canal, and consequent accumulation of matter in that channel. Besides the above facts, the great increase in the amount of urea eliminated by the kidneys on the days referred to, is also indicative of an augmented assimilation of albumen.

On the fifth day, the body commenced rapidly to lose weight. The effects of so exclusive a regimen began to act injuriously upon the system, while febrile excitement, and other symptoms indicative of derangement of the health, were present; and on the seventh day, notwithstanding a great increase in the quantity of albumen ingested, a loss of weight to the extent of 2800 grains occurred. Albumen appeared in the urine on this day, and of the

[1] Letters on Chemistry, p. 315, Lond. ed.
[2] Lehmann's Physiological Chemistry, vol. ii. p. 435, Amer. ed.
[3] Quoted in Carpenter's Physiology, p. 526.
[4] Physiology, p. 526.

amount taken into the stomach, over 1000 grains were recovered from the excrement. The loss from the skin and lungs was unusually great.

The following table, showing the amount of albumen daily absorbed into the system from the intestinal canal, and the quantity of carbon entering into its composition, will serve to place the subject in a more evident light. The proportion of assimilated albumen is found by deducting the collective amount of water extract and insoluble residue of the feces, from the total quantity of albumen ingested. In the estimation of the carbon contained therein I have adopted the analysis of Dumas and Cahours,[1] of the albumen derived from the serum of beef's blood.

TABLE IV.

	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day.	9th day.	10th day.	Mean
Absorbed albumen	8336.59	8455.77	11012.41	12318.22	6317.57	5622.27	9769.76	6377.36	3704.04	4442.89	7835.6
Absorbed carbon	4559.53	4515.37	5800.62	6577.92	3480.38	3002.29	5118.03	3406.51	3045.95	2372.53	4215.7

According to the above table, on only one day (the 4th), did the amount of absorbed carbon equal the wants of the system, if we accept Liebig's estimate of the quantity ordinarily given off by the skin and lungs. On the 3d day, the proportion of carbon entering the system did not fall much below Liebig's standard. On these two days only (as we have seen) did the body gain weight. On all the remaining days, except the 7th (and on this day it was nearly 900 grains less than Liebig's estimate calls for), the quantity of the absorbed carbon was much below the requirements of the organism, and in the mean, was 1800 grains less than the average amount excreted through the skin and lungs, as stated by Liebig.

Leaving, however, all deductions based upon the estimates of others, the broad fact appears, that on the 3d and 4th days of the foregoing researches, not only was enough albumen assimilated to compensate for the total loss from the excretions, but new matter was deposited in quite an appreciable amount. On the 3d day, too, the temperature of the body was fully up to the natural standard, and on the 4th, very materially exceeded it. Without entering further into the details of this point, I think the conclusion is fully supported, that the digestive organs can dissolve enough albumen

[1] Violette et Archambault, Dictionnaire des Analyses Chimiques, p. 62.

to supply the system with the necessary amount of carbon. If the albumen ingested during these experiments had been conjoined with such mineral substances, in such quantities as the blood and tissues require, in order that nutrition may be perfect, it would doubtless have been better borne by the system, and could have been taken in much larger quantities. Under such circumstances, no good reason can be given, why albumen should not have answered all the purposes of plastic formations, and at the same time, have sustained the heat producing function at the proper degree of action.

Whether the opinion of Bidder and Schmidt,[1] that the gastric juice is not secreted in sufficient quantity to dissolve and metamorphose the necessary amount of albumen for the above purposes, and that the intestinal juice[2] is equally as important an agent in effecting these changes, or whether the view of Frerichs and Lehmann,[3] who could discover no such power in the latter fluid, be correct, did not come within the range of these investigations to determine. Contrary, however, to Boussingault's[4] conclusions, based upon his experiments on ducks, and to the indorsement of his view by Lehmann,[5] I think the deduction drawn from the present researches is fully supported by the direct results obtained—at least, so far as regards man, whose physiology it is of the greatest importance thoroughly to understand.

2d. The relation which the nitrogen of the urea and uric acid excreted, bears to the amount absorbed with the albumen.

The relation which the nitrogen excreted by the kidneys has to that taken into the system with the food, is far from being definitely determined, notwithstanding the numerous experiments made with the object of settling the point.

Two views in regard to the origin of urea are held by those who have investigated the subject; one party, of which Lehmann, Frerichs, and Bidder and Schmidt, are specially to be mentioned, maintaining that it is derived both from the decomposition of the tissues of the body and from the oxidation of the albuminates taken as food, whilst the other, of which Liebig and Bischof are the heads, claiming that it is solely derived from the former source.

[1] Die Verdauungssaefte und der Stoffwechsel.—Vom Magensafte, p. 29.
[2] Op. cit.—Vom Darmsafte, p. 260.
[3] Physiological Chemistry, vol. i. p. 510.
[4] Mémoires de Chimie Agricole et de Physiologie, pp. 235, 236.
[5] Physiological Chemistry, vol. ii. p. 495 (Am. ed.).

Whether nitrogenous food is first converted into tissue b its elimination as urea, or whether it undergoes oxidation int substance whilst still in the blood, it would seem impossible i present state of our knowledge to decide. The foregoing inv gations, whilst they cannot be considered as determining this p afford some very striking results, and throw some additional upon the subject.

The following table exhibits for each day of the series, the portion of nitrogen in the absorbed albumen, the amount exc with the urea and uric acid, and the ratio which the nitrogen tained in these substances bore to 100 parts of the quantity was taken into the organism.

TABLE V.

	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day.	9th day.	10th day.	Mea
Absorbed nitrogen	1340.24	1311.55	1728.94	1933.86	1023.25	682.69	1533.85	1001.24	905.53	697.54	135
Excreted with urea	378.95	430.38	542.37	562.86	336.53	340.67	182.24	385.98	163.87	314.56	38
Excreted with uric acid	7.13	7.49	9.64	9.13	6.13	9.72	3.76	6.16	4.89	5.19	6
Total	386.08	437.87	552.01	592.99	342.66	350.39	186.00	392.14	168.80	319.65	47
Excreted for each 100 parts absorbed.	29.55	33.38	32.50	30.66	33.48	39.69	12.12	39.16	17.53	45.81	32

From the above table it is seen that the greatest proportional elimination of nitrogen, in the form of urea and uric acid, occurred on the 6th, 8th, and 10th days, and the smallest on the 7th and 9th In the mean, 30.08 parts per hundred taken into the system, appeared again in the urine, as urea and uric acid.

This result, certainly varies greatly from those obtained by any other observer to whose investigations I have had the opportunity of referring. The experiments of Rigg[1] and of Barral,[2] gave results most nearly in accordance with my own, but there is still a wide difference. The former of these physiologists found that for every 100 parts of absorbed nitrogen, 50.8 were excreted in the urine; the latter, for 100 parts of nitrogen entering the system, found 42.07 in this excretion.

Other physiologists have arrived at results yet more at variance with mine. Lehmann[3] found, that whilst living on a purely animal

[1] Lehmann's Physiological Chemistry, vol. ii. p. 497, 498.
[2] Ibid. [3] Ibid.

diet, five-sixths of the nitrogen taken into the system was given off again by the kidneys. Bidder and Schmidt[1] found, that in a cat, which in 24 hours absorbed 8.604 grammes of nitrogen, 7.786 grammes appeared in the urine. Bischof[2] (among other examples) found, that of 54.09 grammes of nitrogen entering the system of a dog, 29.45 grammes were contained in the excreted urea. It is true, Boussingault[3] recovered from the urine but 87.8 grammes of nitrogen of 139.4 contained in the food of twenty-four hours of a horse, but the excess was in this instance, discharged as a constituent of the feces.

In the present experiments, but a small portion of nitrogen could have been discharged by the urine, as a constituent of other substances than urea or uric acid. The amount of residue, whose exact composition was undetermined, was never very large till towards the last, and although albumen was discovered in the urine after the sixth day, the quantity was not such as to make much difference in the proportions given in Table V. The amount of nitrogen eliminated by the feces was of course very small. (It is to be recollected in this connection, that in estimating the quantity of albumen entering the organism, the unassimilated residue found in the feces, is deducted from the gross amount ingested.)

69.92 grains of nitrogen in every 100 entering the circulation were excreted from the system under some other form than as urea or uric acid, or that proportion, formed new combinations, and was retained within the organism. It is difficult to perceive how this enormous amount could have been given off by the lungs and skin, especially as the most exact observations upon animals have determined the loss of nitrogen through these channels to be exceedingly small.

Frequently, during each day of the investigations, I held a glass rod previously dipped in hydrochloric acid, in the current of the expired air, and, though the white fumes of chloride of ammonium were sometimes produced, this was very seldom, and never in any considerable amount. The skin, during the experiments, had no ammoniacal odor, which would have been present if ammonia in any quantity had been given off.

In view of these facts, I cannot think that the excess of nitrogen escaped from the system as ammonia.

[1] Die Verdauungssaefte und der Stoffwechsel. Tab. v. s. 306.

[2] Der Harnstoff als Maas des Stoffwechsels, s. 65.

[3] Mémoires de Chimie Agricole et de Physiologie, p. 15, et seq.

The only conclusion remaining is, that the greater part of the absorbed nitrogen continued in the organism either as albumen or under the form of other combinations. The decrease of weight in the body, which occurred on every day but the third and fourth, was doubtless mainly owing to the oxidation of a portion of the fat, and is not incompatible with the formation of new matter of an entirely different character.

On a reference to Table II., it is seen that the nitrogenous matters of the blood (fibrin, albumen, and extractive) were very materially augmented in quantity, and that the fat was greatly diminished. These facts constitute a strong additional argument in favor of the supposition advanced above, and tend to support the view of Bischof,[1] that the albuminates of the blood must pass through other processes before they can, merely by the action of oxygen, undergo metamorphosis into urea.

In view of these circumstances, I am disposed to conclude:

1st. That the proportion of nitrogen eliminated by the kidneys to that absorbed into the circulation is, in man, much less than is generally supposed.

2d. That even when the body is losing weight from the oxidation of its fat, the excess of nitrogen over that escaping by the kidneys, is retained in the system, both in its original form, and under that of other combinations.

One of the most important results of the foregoing experiments was the discovery of the presence of albumen in the urine. This it is seen was not made until the seventh day, from which time this substance was not absent during the researches; and subsequent observations showed, that it was a constituent of the excretions for four days after the conclusion of the series.

The fact that albumen is found in the urine has been before noticed in other connections than as associated with granular degeneration of the kidneys. Professor Walshe[2] is of opinion, that it may occur from other diseases, and from the use of certain articles of food. Begbie[3] states, that it may be present in the urine of perfectly healthy persons, in certain conditions of the system (as pregnancy) in certain acute and inflammatory diseases, after eating particular kinds of food (as pastry) after certain remedies (as juni-

[1] Der Harnstoff als Maass des Stoffwechsels, s. 141.

[2] London Lancet, 1849, p. 416.

[3] British and Foreign Medico-Chirurg. Review, July, 1853, p. 46.

per), and after the application of blisters. Bernard[1] mentions the case of a man, who, after eating a large number of raw eggs after fasting, had albumen present in his urine. Bernard, however, is of opinion, that it is only under such conditions, viz., an empty state of the digestive organs, and the sudden ingestion of a large quantity of albuminous food, that such an event can ensue, and Rees[2] denies entirely, that this substance is ever found in the urine as the result of an albuminous diet.

The present researches show, that albuminuria is produced by the continued use of highly albuminous food in large quantities, and that it was not (so to speak) until the system was saturated with albumen, that it made its appearance in the urine.

Without stopping to discuss the other points of these experiments, I proceed to detail the results of the second series, with starch.

II.

STARCH.

The amylaceous substances were, until recently, regarded as being peculiar to vegetable bodies, and the fact of a being presenting distinct evidences of containing them, was sufficient to deny it all claim to an animal existence. This distinctive test, however, can no longer be relied upon. C. Schmidt first showed that cellulose (a substance isomeric with starch) existed as a constituent of the mantle of certain of the tunicata. Gottlieb discovered paramylon (also isomeric with starch) in the body of the infusorium (?) *Euglena viridis*, and other observers, among whom Kölliker, Lœwig, Schacht, and Huxley,[3] are to be mentioned, have fully demonstrated the truth of Schmidt's discovery.

Within a short period, Virchow[4] has carried the investigation still further, and has shown that the corpora amylacea of the human

[1] Leçons de Physiologie expérimentale. Cours de semestre d'hivers, 1854—1855.

[2] London Medical Gazette, vol. xiii. 1851, p. 49.

[3] For translations of Schacht's and Virchow's papers, and Huxley's original article, see Quarterly Journal of Microscopical Science, Nos. 1, 2, 6, 12, and 14.

[4] Ibid.

brain are composed of cellulose, and that this substance is also m with in other parts of the body as the result of a certain disea condition, which he designates as amyloid degeneration.

Busk,[1] however, who has examined this subject very attentive is of the opinion that the corpuscles in the brain, designated a cellulose by Virchow, are, in fact, starch, "possessing all the stru tural, chemical, and optical characters of this substance, as it occ in plants." It may therefore be assumed as a physiological tru that amylaceous substances are not peculiar to vegetables, but a also constituents of the bodies of man, and other animals.

From the fact that starch contains no nitrogen in its composition it cannot contribute to the nutrition of the tissues. Its value, therefore, is generally regarded as resting solely on its heat producing power. In this respect, its easy digestibility renders it superior to fatty substances, although the latter contain a greater proportion of combustible material. Boussingault[2] fed a duck exclusively upon bacon, and found that enough was not assimilated in a given time to repair the loss through the respiratory process. Another duck, fed upon starch, absorbed nearly twice as much as was sufficient to furnish carbon for the wants of the system.

With regard to the process by which starch is digested, much light has been afforded by the labors of recent investigators. Leuchs first established the fact that the saliva possesses the property of changing starch into sugar. Bidder and Schmidt[3] state, as the result of numerous experiments, that when the saliva of adult men was mixed with a solution of starch, the conversion into sugar began instantaneously. They also show, that other juices, and certain tissues of animals, possess the faculty of effecting this metamorphosis.

On the other hand, Bernard,[4] whilst believing that the saliva, under favorable circumstances, out of the body, is capable of transforming starch into sugar, denies it this power within the system, by reason of the short time it is in contact with the food in the mouth, and the fact that the metamorphosis in the stomach is entirely prevented by the gastric juice. He is of opinion that the

[1] Quarterly Journal of Microscopical Science, No. vi. p. 115.

[2] Mémoires de Chimie agricole et de Physiologie, p. 230.

[3] Die Verdauungssaefte und der Stoffwechsel. S. 17.

[4] Leçons de Physiologie expérimentale. Cours de semestre d'été. 1855, p. 155 et seq.

change of starch into sugar is almost solely due to the action of the pancreatic and intestinal juices.

Mialhé[1] combats these views of Bernard, and whilst admitting that the conversion of starch into glucose, initiated by the saliva, may be arrested in the stomach by the acid of the gastric juice, contends, that the former fluid exercises a very powerful influence in effecting the transformation.

Some recent experiments of Professor F. G. Smith,[2] of Philadelphia, would seem to determine this point. Prof. S. found in the case of Alexis St. Martin (the individual upon whom Dr. Beaumont's experiments were instituted), that after eating farinaceous food, sugar was invariably discovered in the contents of the stomach, and concludes "that the human gastric juice does not prevent the conversion of starch into grape sugar, and that this change may take place in the stomach independently of the action of the saliva." His investigations appear to have been conducted with great care, and I shall therefore adopt his conclusions.

The change which is commenced by admixture of the amylaceous food with the saliva in the mouth, is continued in the stomach, by the quantity of this secretion swallowed with the aliment. The gastric, pancreatic, and intestinal juices, especially the second named, assist in the process, and eventually, through the combined influence of these several secretions, the starch is brought into a fit form for assimilation. The greater part is absorbed into the circulation as grape sugar, a portion undergoes continued metamorphosis into lactic and butyric acids, and occasionally another part, which has escaped alteration, is discharged with the alvine dejections.

Such is a very condensed outline of some of the principal points of interest connected with the substance under consideration. I now proceed to state my own investigations.

The starch used in these experiments was of the form generally known as corn-starch, and being manufactured for table use, was of a purer quality than the ordinary article. It was always cooked before ingestion, but was taken free from any other substance than the necessary amount of water. The figures in the following pages expressive of the quantity of starch ingested, refer to the dry substance before it was cooked; those relating to the amount of water, refer both to that portion of this liquid taken with the starch, and

[1] Chimie appliquée à la Physiologie, etc., p. 38, et seq.

[2] Medical Examiner, September, 1856, p. 513, et seq.

the quantity drank. The water used was either distilled, or snow or rain water.

The investigations were performed under the same conditions (other than the food) as the former series, and as stated at length in the introduction. Such deviations from the standard course as were unavoidable, are specially noted. The researches continued ten days.

Thirty days elapsed from the conclusion of the experiments with albumen till the commencement of the present series. In that time my health had entirely recovered, and the weight of the body had undergone a small, but steady increase.

At the end of the twenty-four hours immediately preceding the commencement of the following researches, my weight was 224.5 pounds.

FIRST DAY.

INGESTA.

8 A.M.	Starch	3000	Water	8550
1 P.M.	"	4000	"	8500
5 "	"	2500	"	7450
Total	"	9500	"	24500

EGESTA.

Kidneys.

Whole quantity of urine 14339.51.

Water	13588.69	
Solids	750.82	
Urea		421.57
Uric acid		6.34
Chlorine		85.26
Sulphuric acid		30.45
Phosphoric acid		27.18
Residue		180.02

Intestines.

Whole quantity of feces 1041.86.

Water	816.96	
Solids	224.90	
Ether extract		49.72
Alcohol extract		50.29
Water extract		30.18
Insoluble residue		94.71

Skin and Lungs.

Total loss through these channels 19798.34.

My pulse at 7 A.M. was 80, at 2 P.M. 82, and at 10 P.M. 84.—Mean 82.

The temperature of the body at the above hours was respectively 98°, 97.5°, and 97°.—Mean 97.50°.

At 3 P.M. I abstracted 1480.29 grains of blood from the median basilic vein. The following is the analysis:—

1000 parts of serum—	
Water	907.34
Solids	92.66
Albumen	75.02
Extractive	6.18
Soluble salts	10.72
	91.92
Difference	.74

The whole quantity of inorganic salts in 1000 parts of serum was 11.98.

1000 parts of blood—	
Water	779.33
Solids	220.77
Fibrin	1.99
Blood-corpuscles	141.18
Albumen	63.66
Extractive	4.84
Soluble salts	9.31
	220.98
Difference	.21

The whole quantity of inorganic salts in 1000 parts of blood was 10.42. In 1000 parts of defibrinated blood was 1.83 of fat.

The weight of the body at the end of the twenty-four hours was 224.49 pounds; being a loss of .38 pound, or 2660 grains; of which 1480.29 are represented by the amount of blood drawn for examination, leaving 1179.71 as the excess of loss from the excretions.

The mean height of the barometer for the twenty-four hours was 29.276 inches, and of the thermometer 1.66°.

On this day I had no abnormal symptoms of any kind. My appetite was very good, and the starch was relished as a pleasant article of food. At night, slept well. I took but very little physical exercise on this day, owing to the extreme coldness of the weather.

SECOND DAY.

INGESTA.				
8 A.M.	Starch	3000	Water	6250
1 P.M.	"	3500	"	10000
5 "	"	4000	"	10000
Total	"	10500	"	26250

EGESTA.

Kidneys.

Whole quantity of urine 14970.83.

Water	14327.62	
Solids	643.21	
Urea		369.15
Uric acid		5.42
Chlorine		31.04
Sulphuric acid		19.63
Phosphoric acid		25.97
Residue		183.95

Intestines.

Whole quantity of feces 1076.53.

Water	858.18	
Solids	218.35	
Ether extract		51.36
Alcohol extract		39.12
Water extract		24.39
Insoluble residue		103.48

Skin and Lungs.

Total loss through these channels 21122.64.

My pulse was at 7 A. M. 83, at 2 P. M. 85, and at 10 P. M. 84.—Mean 84.

At the same periods the temperature of the body was respectively 98°, 98.5°, and 98°.—Mean 98.16°.

The weight of the body at the end of the twenty-four hours was 224.43 pounds; a loss of .06 pound, or 420 grains.

The mean height of the barometer was 29.086 inches, and of the thermometer 3°.

No unusual symptoms of any kind occurred. Appetite good, sleep sound and refreshing. At about 9 P. M., through inadvertence, I drank two ounces of hot whiskey punch.

THIRD DAY.

INGESTA.

8 A.M.	Starch	3300		Water	8900
1 P.M.	"	3500		"	9526
5 "	"	4500		"	10500
Total	"	11300		"	28926

EGESTA.

Kidneys.

Whole quantity of urine 19735.24.

Water	19296.09	
Solids	439.15	
Urea		225.06
Uric acid		5.18
Chlorine		14.27
Sulphuric acid		12.07
Phosphoric acid		26.61
Residue		155.96

Intestines.

Whole quantity of feces 925.01.

Water	724.47	
Solids	200.54	
Ether extract		45.13
Alcohol extract		28.74
Water extract		35.41
Insoluble residue		91.26

Skin and Lungs.

Total loss from these channels 18585.75.

My pulse at 7 A.M. on this day was 82 per minute, at 2 P.M. 84, and at 10 P.M. 85.—Mean 83.66.

The temperature of the body at the same hours was respectively 98°, 98°, and 98.5°.—Mean 98.16°.

My weight at the end of the twenty-four hours was 224.57; showing an increase over the preceding day of .14 pound, or 980 grains.

The mean height of the barometer was 29.213 inches; that of the thermometer was 4.66°.

Notwithstanding the increase of weight, I felt somewhat weak on this day. My appetite was excellent, and the starch was still relished. The urine was of a somewhat darker color than usual. Numerous starch granules were discovered in the feces by the microscope.

FOURTH DAY.

INGESTA.

8 A.M.	Starch . . .	3000	Water . . .	8500
1 P.M.	" . . .	3500	" . . .	9500
5 "	" . . .	5500	" . . .	11000
Total	" . .	12000	" . .	29000

EGESTA.

Kidneys.

Whole quantity of urine 20245.10.

Water	19787.10	
Solids	458	
Urea		204.29
Uric acid		7.53
Chlorine		8.41
Sulphuric acid		10.55
Phosphoric acid . . .		18.29
Residue		216.74

Intestines.

Whole quantity of feces 1438.15.

Water	1013.08	
Solids	425.07	
Ether extract		40.26
Alcohol extract . . .		29.13
Water extract		28.64
Insoluble residue . . .		327.01

Skin and Lungs.

Total loss through these channels 18476.25.

My pulse at 7 A.M. was 82, at 2 P.M. 84, and at 10 P.M. 84.—Mean 83.33.

At the same hours the temperature of the body was respectively 98.5°, 99°, and 99°.—Mean 98.83°.

At the termination of the twenty-four hours my weight was 224.79 pounds; an increase over the preceding day of .12 pound, equivalent to 840 grains.

The mean height of the barometer was 29.366 inches, and of the thermometer 0.66°.

I felt a good deal of debility during this day, my mind was not active, and there was great indisposition to physical exertion. The appetite was good, but, for the first time, there was some little dis-

aste for the starch, and a great desire to mix salt with it. I experienced at intervals during the day a feeling of oppression about ne lungs, which was only relieved by a full inspiration; at night ad frequent dreams of falling from precipices, and awoke several imes with a sudden start. I also noticed, that the saliva was unusually thick and ropy. Under the microscope, an extraordinarily arge number of epithelial cells and mucus globules were discovered. It was neutral to test paper.

FIFTH DAY.

INGESTA.

8 A.M.	Starch	3000	Water	8000
1 P.M.	"	3800	"	9000
5 "	"	4000	"	10000
Total	"	10800	"	27000

EGESTA.

Kidneys.

Whole quantity of urine 18275.82.

Water	17885.11	
Solids	390.71	
Urea		160.47
Urie acid		7.26
Chlorine		8 03
Sulphuric acid		6.70
Phosphoric acid		10.55
Residue		197.70

Intestines.

Whole quantity of feces 1145.90.

Water	937.68	
Solids	205.22	
Ether extract		35.78
Alcohol extract		30.65
Water extract		20.50
Insoluble residue		118.29

Skin and Lungs.

Total loss through these channels 18518.28.

My pulse at 7 A.M. was 85, at 2 P.M. 87, and at 10 P.M. 87.—Mean 86.33.

The temperature of the body at the same hours was respectively 98.5°, 99°, and 99.5°.—Mean 99°.

At the end of the twenty-four hours my weight was 224. pounds; showing a loss of .02 pound, or 140 grains.

The mean height of the barometer was 29.510 inches, and of the thermometer 1°.

On this day I felt exceedingly feeble. The mind was dull, and it required an effort to fix it upon any subject. Scarcely any physical exercise was taken. The feeling of oppression at the chest had increased, and there was a good deal of sighing respiration. At 12 M., and at 4 P. M., had slight palpitation of the heart. There was some pain in the abdomen through the day, and a large quantity of flatus was discharged with the feces. Slept better than on the previous night, but awoke in the morning with a most intense pain over the left supraorbital arch. This was so severe that I was unable to endure it, and I took forty grains of magnesia with almost instantaneous relief; showing that in all probability the headache was caused by acidity of the stomach. The saliva was of the same character as on the previous day. The microscope still showed an unusual amount of epithelial scales and mucus globules. Reaction neutral.

The urine passed, on rising from bed, was of a darker color than at any time previous during this series of experiments. On testing it for sugar, by Trommer's method (as had been done every day during the investigations), there was a clear and well marked precipitate of the suboxide of copper. The fermentation test, and examination with the microscope for the *torula cerevisiæ*, were both subsequently applied with affirmative results.

SIXTH DAY.

INGESTA.

8 A.M.	Starch	. . .	2500	Water . . .	6200
1 P.M.	"	. . .	3500	" . . .	9050
5 "	"	. . .	4000	" . . .	10000
Total	"	. .	10000	" . .	25250

EGESTA.

Kidneys.

Whole quantity of urine 15160.06.

Water	14631.87
Solids	528.19

Urea		176.28
Uric acid		8.49
Chlorine		6.22
Sulphuric acid		4.12
Phosphoric acid		5.64
Residue		347.84

Intestines.

Whole quantity of feces 1097.

Water	910.47	
Solids	186.53	
Ether extract		29.89
Alcohol extract		34.75
Water extract		14.65
Insoluble residue		107.24

Skin and Lungs.

Total loss through these channels 18782.94.

The pulse at 7 A.M. was 85 per minute, at 2 P.M. 85, and at 10 P.M. 90.—Mean 87.66.

At the same periods the temperature of the body was respectively 99°, 99°, and 99.5°.—Mean 99.16°.

At the termination of the twenty-four hours my weight was 224.81 pounds; an increase of .03 pound, or 210 grains.

The mean height of the barometer was 29.426 inches, and of the thermometer 9.33°.

The debility was still present. Notwithstanding the magnesia taken the previous day, there was considerable torpor of the bowels. Mental phenomena unchanged. The skin was hot, and there was some fever towards night. The oppression at the chest had, in a measure, subsided. The palpitation of the heart, however, still remained, and was very annoying. I was also troubled a good deal with pyrosis. Rested well at night.

All the urine discharged on this day exhibited (with the tests previously employed) undoubted evidences of containing sugar. The saliva was more natural in its character, though of very feeble alkaline reaction.

My friends noticed, by this time, a change in my personal appearance. My countenance was unusually pale, and my lips of a slight bluish tinge; showing deficient aëration of the blood, or an excessive accumulation of carbonaceous matter in the system.

SEVENTH DAY.

INGESTA.

8 A.M.	Starch	2500	Water	7000
1 P.M.	"	3500	"	8000
5 "	"	3500	"	9300
Total	"	9500	"	24300

EGESTA.

Kidneys.

Whole quantity of urine 15282.25.

Water	14856.45	
Solids	425.80	
Urea		157.05
Uric acid		8.36
Chlorine		4.74
Sulphuric acid		3.81
Phosphoric acid		5.70
Residue		244.14

Intestines.

Whole quantity of feces 946.17.

Water	750.70	
Solids	195.47	
Ether extract		33.76
Alcohol extract		34.29
Water extract		27.42
Insoluble residue		100.

Skin and Lungs.

Total loss by these channels 17921.58.

At 7 A.M. the pulse was 87, at 2 P.M. 89, and at 10 P.M. 93.—Mean 89.66.

At the above hours, the temperature of the body was respectively 98°, 98.5°, and 98.5°.—Mean 98.33°.

At the end of the twenty-four hours the weight of the body was 224.76 pounds; a decrease of .05 pound, or 350 grains.

The mean height of the barometer was 29.141 inches, that of the thermometer 12.33°.

The palpitation of the heart was very troublesome on this day, as was also the pyrosis. Debility excessive, especially in the muscles of the back. The desire for other food was very great. The starch was by this time exceedingly disagreeable. One or two

slight scratches, which I had received on the hand the day before, became painful, and showed a tendency to inflammation and suppuration. Such a thing had never happened to me before; my flesh always healing readily after such injuries. I did not sleep well, was quite feverish during the night, and awoke in the morning with severe headache.

The urine was still saccharine, of a dark-brown color, and very acid reaction. Saliva natural.

Numerous starch granules were discovered with the microscope in the feces. This excretion was also very acid in its reaction, and of a dark, almost black color.

EIGHTH DAY.

INGESTA.

8 A.M.	Starch	2225	Water	5700
1 P.M.	"	2525	"	10000
5 "	"	3500	"	10000
Total	"	8250	"	25700

EGESTA.

Kidneys.

Whole quantity of urine 20130.87.

Water	19781.62	
Solids	549.25	
Urea		185.33
Uric acid		7.94
Chlorine		4.30
Sulphuric acid		3.09
Phosphoric acid		5.86
Residue		342.73

Intestines.

Whole quantity of feces 900.61.

Water	758.88	
Solids	141.73	
Ether extract		30.13
Alcohol extract		25.37
Water extract		12.60
Insoluble residue		73.63

Skin and Lungs.

Total loss from these channels 14048.52.

At 7 A.M. my pulse was 92, at 2 P.M. 94, and at 10 P.M. 94.—Mean 93.33.

The temperature of the body at the above hours was respectively 98.5°, 99.5°, and 99°.—Mean 99°.

My weight at the end of the twenty-four hours was 224.57 pounds; a loss from the preceding day of .19 pound, or 1330 grains.

The mean heights of the barometer and thermometer were respectively 29.105 inches, and 15.33°.

Violent headache was present during the whole day. The mind was somewhat confused; an almost constant twitching of the left superior eyelid was experienced, and caused me a great deal of annoyance. The oppression of the chest had returned, and was only relieved by frequent, full, and deep inspirations. There were also griping pains in the lower part of the abdomen, attended with the discharge of much flatus. The pyrosis still continued. Palpitation of the heart less violent and frequent. Several boils made their appearance on various parts of the body.

The urine, when tested, as before mentioned, exhibited the same characteristic signs of the presence of sugar as previously. Reaction strongly acid. Starch granules in the feces.

NINTH DAY.

INGESTA.

8 A.M.	Starch	3500	Water	7600
1 P.M.	"	3500	"	9500
5 "	"	4500	"	10500
Total	"	11500	"	27650

EGESTA.

Kidneys.

Whole quantity of urine 23352.11.

Water	22879.95	
Solids	472.16	
Urea		132.58
Uric acid		9.47
Chlorine		8.01
Sulphuric acid		2.61
Phosphoric acid		5.50
Residue		313.99

Intestines.

Whole quantity of feces 1256.45.

Water	1043.21	
Solids	213.24	
Ether extract		21.36
Alcohol extract		18.51
Water extract		15.74
Insoluble residue		157.63

Skin and Lungs.

Total loss from these channels 13631.44.

At 7 A.M. on this day my pulse was 90, at 2 P.M. 93, and at 10 P.M. 95.—Mean 92.66.

The temperature of the body at these hours was respectively 99.5°, 99.5°, and 100°.—Mean 99.66°.

The weight of the body at the end of the twenty-four hours was 224.70 pounds; an increase of .13 pound, or 910 grains over the previous day.

The mean height of the barometer was 29.252 inches, and of the thermometer 13°.

The symptoms observed on this day did not differ materially from those of the day before. I was obliged, however, from weakness and general indisposition, to go to bed at 8 P.M. Did not sleep well.

The urine was still highly saccharine, and of the same clear brown color as before noticed.

TENTH DAY.

INGESTA.

8 A.M.	Starch	2200	Water	6000
2 P.M.	"	4525	"	11500
5 "	"	3500	"	9000
Total	"	10225	"	26500

EGESTA.

Kidneys.

Whole quantity of urine 22785.

Water	22272.43
Solids	512.57

Urea	121.77
Uric acid	9.36
Chlorine	1.89
Sulphuric acid	2.26
Phosphoric acid	5.31
Residue	340.59

Intestines.

Whole quantity of feces 1250.27.

Water	945.42	
Solids	204.85	
Ether extract		25.63
Alcohol extract		25.80
Water extract		17.43
Insoluble residue		135.49

Skin and Lungs.

Total loss from these channels 12599.73.

My pulse at 7 A.M. was 91, at 2 P.M. 90, and at 10 P.M. 93.—Mean 91.33.

The temperature of the body at the same hours, was respectively 99°, 99.5°, and 99.5°.—Mean 99.33°.

At 3 P.M. I abstracted 1350 grains of blood from the median basilic vein, and, upon analysis, found it to be constituted as follows:—

1000 parts of serum—		1000 parts of blood—	
Water	920.81	Water	796.49
Solids	79.19	Solids	203.51
Albumen	63.45	Fibrin	3.15
Extractive	12.35	Blood-corpuscles	132.60
Soluble salts	2.12	Albumen	55.96
	77.92	Extractive	11.25
Difference	1.27	Soluble salts	1.87
			204.83
		Difference	1.32

The whole quantity of inorganic salts in 1000 parts of serum was 2.89.

The whole quantity of inorganic salts in 1000 parts of blood was 2.05. In 1000 parts of defibrinated blood were 2.74 of fat.

The weight of the body at the end of the twenty-four hours was 224.53 pounds; being a loss of .18 pound, or 1260 grains. As, however, 1350 grains of blood were taken from the body, there

was an actual increase of 90 grains, or, more properly, would have been, but for the loss of blood.

The mean height of the barometer was 29.155 inches, and of the thermometer 12.66°.

The general symptoms observed were of the same character as those of the last two days, but more strongly marked.

The urine was highly saccharine, and of the same brown color; resembling Madeira wine.

The immediate effect of the slight abstraction of blood was to relieve the feeling of oppression at the chest; but in an hour it returned with increased violence. The debility was very great.

The experiments with starch were now at an end. Immediately on their termination, I ate a hearty breakfast, but my stomach was in so weak and disordered a condition, that the food was almost instantly rejected. I found that I was obliged to resume my ordinary diet with some degree of caution. After a few days, I became free from all unpleasant symptoms, and rapidly regained my usual good health. It is remarkable, however, that for the first few days after the conclusion of the experiments, I steadily lost weight, so that on the tenth day, I weighed but 223.18 pounds. Sugar was detected in the urine till the morning of the sixth day.

The accompanying table embraces the main results of the foregoing investigations:—

TABLE VI.

	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day.	9th day.	10th day.	Total.	Mean.
INGESTA.												
Starch	9500	10500	11300	12000	10800	10000	9500	8250	11500	10225	103575	10357.50
Water	24500	26250	28926	29000	27000	25250	24300	25700	27650	26500	265076	26507.60
Total	34000	36750	40226	41000	37800	35250	33800	33950	39150	36725	368651	36865.10
EGESTA.												
Kidneys—												
Whole quantity of urine	14339.51	14970.83	19735.24	20245.10	18275.82	15160.06	15282.25	20130 87	23352.11	22785.00	184276.79	18427.67
Water	13588.69	14327.62	19296.09	19787.10	17885.11	14631.87	14856.45	19781.62	22879 95	22272.43	179706 93	17910.69
Solids	750 82	643.21	439.15	458.00	390.71	528.19	425.80	549.25	472.16	512.57	5169.86	516.98
Urea	421.57	369.15	225.06	204.29	160.47	176.28	157.05	185.33	132.58	121 77	2153.55	215.35
Uric acid	6.34	5.42	5.18	7.53	7.26	8 49	8 36	7.94	9.47	9.36	75.35	7.53
Chlorine	85.26	31 04	14.27	8.41	8.03	6.22	4.74	4.30	3.01	1.89	167.17	16.71
Sulphuric acid	30.45	19.68	12.07	10.55	6.70	4.12	3.81	3.09	2.61	2 26	97.34	9.73
Phosphoric acid	27 18	25.97	26.61	18.29	10 55	5 64	5.70	5.86	5.50	5.31	136.67	13.66
Residue	180.02	183.95	155.96	216.74	197.70	347.84	244.14	342.73	318.99	340.59	2528.66	252.86
Intestines—												
Whole quantity of feces	1041.86	1076.53	925.01	1438.15	1145.90	1097.00	946.17	900.61	1256.45	1250.27	11077.95	1107.80
Water	816.86	858.18	724.47	1013.08	937.68	910.47	750.70	756.88	1043.21	945.42	8862.15	886.21
Solids	224.90	218 35	200.54	425.07	205.22	186.53	195.47	141.73	213.24	204.85	2215.90	221.59
Ether extract	49.72	51.36	45.13	40.26	35 78	29.89	33.76	30.13	21.36	25.63	363.02	36.30
Alcohol extract	50.29	39.12	28.74	29.13	30.65	34.75	34.29	25.37	18.51	25.80	316.65	31.66
Water extract	30 18	24.39	35.41	28.64	20.50	14.65	27.42	12.60	15.74	17.43	226 96	22.69
Insoluble residue	94.71	103.48	91.26	327.01	118 29	107 24	100.00	73.63	157.63	135.49	1309.54	130.95
Skin and Lungs—												
Total loss by these channels	19798.34	21122.64	18585.75	18476.25	18518 28	18782.94	17921.58	14248.52	13681.44	12590.73	173686.97	17368.59
Total egesta	35179.71	37170.00	30246.00	40160.00	37940.00	35040.00	34150.00	36280.00	38240.00	36620.00	360940.71	36094.07
Variation in weight of body	—1179.71	—420.00	+980 00	+840.00	—140.00	+210.00	—350.00	—1330.00	+910.00	+90.00	—339.71	—33.97
Pulse	82	84	83 66	83.66	86.33	87 66	89.66	93.33	92.66	91.33	..	87 42
Temperature of body	97.50°	98.16°	98.16°	98.83°	99°	99.16°	98.33°	99°	98.66°	99.33°	..	98 81
Barometer	29.276	29.086	29.213	29.306	29.510	29.426	29.141	29.105	29.252	29.155	..	29.258
Thermometer	—1.66°	3°	—4.66°	—0.66°	1°	9.33°	12.33°	15.33°	13°	12.66°	..	6.08°

A consideration of the foregoing investigations, and comparison of the results with those of the standard series, show that under the use of food consisting only of starch and water, the following effects ensued.

Kidneys.—The whole quantity of urine was lessened, as was also the amount of its solid matter, and that of each constituent (urea, uric acid, chlorine, and sulphuric and phosphoric acids). The residue of solid matter remaining after the deduction of the sum of the above named substances was, however, greatly increased.

The diminution in the quantity of urine eliminated, was partly due to the fact that there was a less amount of fluids ingested than during the preliminary series, and partly, that the food was not of a character to maintain the several solid constituents at their ordinary normal amounts. It was from this latter cause that so great a reduction took place in the quantity of urea, uric acid, chlorine, and sulphuric and phosphoric acids. During the present investigations, these substances must have been entirely derived from the disintegrated tissues of the body; the food containing no matter from which they could have been elaborated.

The increase of solid residue was probably owing to the sugar present, and, perhaps, to some other substance containing a large proportion of carbon. The increased depth of color observed in the urine, supports this latter hypothesis. Recent investigations have almost completely established the fact, that the coloring matter of the urine is a vehicle for the removal of carbon which has not been eliminated by other channels.[1]

The fact that sugar was detected in the urine after a few days' use of the starch, is important physiologically, and must have no little bearing upon the pathology of a disease as yet but little understood.

According to Bernard,[2] sugar in the animal economy has an internal and external origin, the liver being the organ by which it is formed in the system, and the food furnishing that derived from without. This physiologist is, however, of opinion (and he adduces many striking experiments in support of this theory), that normally the sugar taken into the system with the food, and which enters the portal vein, never reaches the general circulation, but is destroyed

[1] Bird. Urinary Deposits, p. 88.

[2] Leçons de Physiologie expérimentale. Cours de semestre d'hivers, 1854, 1855. The reader is referred to this work for Bernard's views in full.

by the liver, and transformed into an emulsive substance, poss
ing none of the chemical or physical characteristics of sugar. T
sugar of the food, therefore, is never normally found as a con
tuent of the urine. To this rule he makes an exception as regi
cases of fasting, and the subsequent ingestion of a large quantity
sugar. Then, he states, absorption from the intestines taking pl
with increasing energy, a great quantity of sugar is thrown in
the liver, and, being more than it is able to transform, the exc
passes into the main circulation, and is found in the urine.

The present investigations, it is seen, are entirely opposed t
Bernard's doctrine of the perfect destruction of the alimentar
sugar by the liver, as it is not probable the sugar found in t
urine could have had any other origin than the food which w
transformed into this substance in the intestines, and absorbed a
such into the circulation.

In obtaining this result, I am not altogether alone. Von Beck
has definitely established the fact, that the amount of sugar in th
blood is influenced by the character of the food, and Uhle and Le
mann found it to appear in the urine of rabbits after the injectio
of a solution containing it into the blood.

I am disposed to regard the appearance of sugar in the urin
ensuing upon the excessive use of amylaceous food, to be due to a
deficient relative amount of oxygen in the blood. This hypothesis
may be more clearly set forth by recalling the facts, that before
assimilation, the starch taken as food is transformed into dextrin
then into glucose or grape sugar, and is chiefly under this form ab
sorbed into the system. The sugar, after its entrance into the blood-
vessels (provided a sufficient amount of oxygen be brought into
chemical contact with it), is, after undergoing continued metamor-
phosis, entirely decomposed into carbonic acid and water, and, as
such, is eliminated from the pulmonary mucous membrane. A de-
ficiency of oxygen causes a partial interruption of this process, and
a portion of the sugar is merely metamorphosed into fat, and under
this form remains in the system. A still greater deficiency of
oxygen, or, what amounts to the same, a corresponding increase of
the quantity of sugar in the blood, would cause a portion of this
latter substance entirely to escape metamorphosis, and this portion
would make its appearance as a constituent of the urine if aug-
mented beyond a definite amount. In support of this theory are
to be adduced the numerous carefully conducted investigations of
Dechambre, from which it appears that sugar is constantly to be

met with in the urine of the aged as an effect of deficient hæmatosis. It is well known that the use of feculent food invariably increases the proportion of this substance in diabetic urine.

Intestines.—The quantity of feces was reduced, as was also that of each of its constituents determined.

The decrease in the total amount of feces was due to the facts, that starch is a substance of easy digestibility, and that no indigestible substances were taken into the system.

The reduction in the amounts of ether, alcohol, and water extracts, was also mainly owing to the character of the aliment. As no fat was taken with the food, it would seem that the first of these was present in greater amount than could have been expected, unless we adopt the hypothesis that farinaceous food is converted into fat in the intestines; to which theory the experiments of Boussingault on ducks are directly at variance.

The weight of the body is seen to have declined altogether 469.71 grains, not counting, in this calculation, the weight of the blood abstracted for analysis. This loss is much less than the drain from the waste of the nitrogenous tissues, and shows that a very considerable amount of new matter must have been deposited within the system. The chemical constitution of starch forbids the idea that this material could have been of a nature to serve for the renovation of the worn-out tissues of the body. It must, on the contrary, have consisted of fat, derived from the metamorphosis of the amylaceous food. The slight loss of weight observed shows, therefore, that the starch was assimilated not only in quantity sufficient for the immediate wants of the system, but also in such an amount as to allow the deposition of fat to such an extent as, within a few grains, to compensate for the total loss through the nitrogenous constituents of the excretions. The actual increase observed in the temperature of the body, and several of the pathological occurrences, also show that there was no deficiency of carbon in the system.

Effect upon the Constitution of the Blood.—The annexed table exhibits the results of the analysis of the blood on the 1st and 10th days of the experiments.

TABLE VII.

1000 parts of serum—	1st day.	10th day.	1000 parts of blood—	1st day.	8th day
Water	907.34	920.81	Water	779.33	796.8
Solids	92.66	79.19	Solids	220.77	203.2
Albumen	75.02	63.45	Fibrin	1.99	3.1
Extractive . . .	6.18	12.35	Blood-corpuscles .	141.18	132.6
Soluble salts . .	10.72	2.12	Albumen	63.66	55.8
Whole quant. inorg. salts	11.98	2.89	Extractive	4.84	11.2
			Soluble salts	9.31	1.5
			Whole quant. inorg. salts	10.42	2.6
			Fat	1.83	2.7

From this table it is seen that, in the serum, the water was increased in quantity, and the solids proportionally diminished. The albumen and salts were reduced in amount, whilst the extractive was very much increased.

In the whole blood, the proportion of water was likewise increased, and that of the solids lessened. The fibrin, extractive and fat, were augmented; the blood-corpuscles, albumen, and salts diminished.

Most of these results were to have been anticipated. The most important of them are the increase in the fibrin, extractive, and fat.

So many different views of the value and character of the fibrin of the blood are held by physiologists, that I merely state the fact of its occurrence in this fluid in increased amount after farinaceous diet, without attempting to account for it. Whether fibrin is a substance of the ascending or descending grade of metamorphosis, is as yet far from determination.

The increase in the amount of fat is sufficiently accounted for by the character of the food, and might have been anticipated, if the theory given explanatory of the cause of the presence of sugar in the urine be regarded as correct. The diminished amount of fat in the blood after the albuminous diet, and its increase after an amylaceous one, show that the proportion of this substance in the circulating fluid is subject to variation with the character of the ingesta; a circumstance with which the experiments of Boussingault[1] are at variance.

The increase in the proportion of the extractive, was probably due to some carbonaceous substance present in augmented quantity.

[1] Op. cit., p. 281, et seq.

Upon the whole, if further evidence of the incapability of starch to sustain for any length of time health or life in the human subject were wanting, the present investigations would appear to furnish it. The value of starch is, however, very great, for, notwithstanding the derangement of the health, both physical and mental, produced by strict adherence to a diet of this substance, it is perceived that but slight loss of weight occurred. This latter fact, resulting as it did from the deposition of fat, is not to be regarded as an entirely normal result. Nevertheless, it is a most valuable indication that farinaceous food fulfils the condition of supplying a sufficiency of carbon to the system.

III.

GUM.

The chemical constitution of gum differs from that of starch, only in containing two additional atoms of both hydrogen and oxygen. It is never found as a component part of the bodies of animals, and of the vegetable substances ordinarily used as food by man, few, if any, contain it. It is, however, occasionally employed in the sick-room, from an idea, formerly very prevalent and not yet entirely extinct, that it possesses great nutritive power, and is sometimes met with as an ingredient of certain sweet-meats.

Notwithstanding that it is exceedingly soluble in water, the recorded experiments of several physiologists tend to show, that gum is possessed of little or no nutritive value, or capability of supporting respiration, owing to its almost complete indigestibility. Thus, Boussingault[1] fed a duck with fifty grammes of gum Arabic, and found forty-six in the excrements, and Frerichs, Blondlot, and Lehmann,[2] found that neither the saliva nor gastric juice exercised any digestive effect upon this substance.

With the object of contributing to the more complete elucidation of the subject, the following investigations were instituted. My original intention was to have continued them, if possible, ten days, as in the former two series; but, owing to the debility and great

[1] Mémoires de Chimie agricole et de Physiologie, p. 232.
[2] Lehmann's Physiological Chemistry, vol. ii. p. 386.

derangement of health produced, I was obliged, very much to my regret, to discontinue them at the end of the fourth day.

Pure gum Arabic was the article used during these investigations. It was ingested dissolved in water (the proportion of the liquid entering into its composition having been previously ascertained). The figures relating to the gum refer to the dry substance, and those indicating the quantity of water, to the whole amount of this liquid taken into the stomach uncombined, as with the gum. The water was distilled, or rain-water. No other food was taken.

The conditions of physical and mental exercise, sleep, &c., were as far as possible the same as in the previous series. I was unable, however, to adhere as rigidly to the standard system as I desired. The deviations are noticed in the proper places. Twenty-five days elapsed between the termination of the starch series of investigations and the commencement of the present. At this latter time my health appeared to be very good. At the end of the twenty-four hours immediately preceding my weight was 225.33 pounds.

FIRST DAY.

INGESTA.

8 A.M.	Gum	2300	Water	9000
1 P.M.	"	3000	"	10000
5 "	"	3000	"	10000
Total	"	8300	"	29000

EGESTA.

Kidneys.

Whole quantity of urine 20728.61.

Water	20157.03	
Solids	571.58	
Urea		330.15
Uric acid		7.45
Chlorine		46.28
Sulphuric acid		21.57
Phosphoric acid		24.13
Residue		142.

Intestines.

Whole quantity of feces 8529.14.

Water	3284.34
Solids	5244.80

Ether extract	31.55
Alcohol extract . . .	30.27
Water extract	5030.36
Insoluble residue . . .	152.62

Skin and Lungs.

Total loss through these channels 12422.94.

My pulse at 7 A.M. was 80, at 2 P.M. 84, and at 10 P.M. 89.—Mean 84.33.

At the same hours, the temperature of the body was respectively 98.5°, 98°, and 97.5°.—Mean 98°.

At 3 P.M. I took 1359.31 grains of blood from the median basilic vein. This, upon analysis, was found to be constituted as follows:—

1000 parts of serum—	
Water	907.43
Solids	92.57
Albumen . . .	77.36
Extractive . . .	5.15
Soluble salts . . .	9.22
	91.73
Difference . . .	.84

The whole quantity of inorganic salts in 1000 parts of serum was 11.01.

1000 parts of blood—	
Water	778.04
Solids	221.96
Fibrin	2.05
Blood-corpuscles .	138.22
Albumen . . .	66.32
Extractive . . .	4.08
Soluble salts . . .	7.96
—	218.63
Difference . . .	3.33

The whole quantity of inorganic salts in 1000 parts of blood was 10.49. 1000 parts of defibrinated blood contained 2.13 of fat.

The weight of the body at the end of the twenty-four hours was 224.57 pounds; being a loss of .82 pound, or 5740 grains; of which 1359.31 are to be ascribed to the blood abstracted for analysis, leaving a balance of 4380.69 grains as the actual loss from the excretions.

The mean height of the barometer on this day was 28.324 inches, and of the thermometer 31.33°.

About the middle of this day I felt quite hungry. After eating the gum at 5 P.M., this feeling subsided, but returned again in the course of the evening. I had severe colicky pains in the lower part of the abdomen after eating the second meal of gum. Had two evacuations from the intestinal canal; one at 9 P.M., and one at 6½ A.M. The feces of both were hard, of a dark brown color, and of a very strong acid reaction.

SECOND DAY.

INGESTA.

8 A.M.	Gum	2150	Water		9300
1 P.M.	"	2100	"		10000
5 "	"	3000	"		10050
Total	"	7250	"		29350

EGESTA.

Kidneys.

Whole quantity of urine 21385.97.

Water	20934.74	
Solids	451.23	
Urea		301.24
Uric acid		8.20
Chlorine		21.15
Sulphuric acid		12.05
Phosphoric acid		13.35
Residue		95.24

Intestines.

Whole quantity of feces 9350.28.

Water	3975.09	
Solids	5375.19	
Ether extract		17.43
Alcohol extract		12.84
Water extract		5297.62
Insoluble residue		47.20

Skin and Lungs.

Total loss through these channels 11883.75.

At 7 A.M. on this day my pulse was 88, at 2 P.M. 88, and at 10 P.M. 94.—Mean 90.

At the corresponding hours the temperature of the body was respectively 97°, 97.5°, and 97.5°.—Mean 97.33°.

At the termination of the twenty-four hours my weight was 223.65; a loss of .86 pound, or 6020 grains.

The mean height of the barometer was 28.706 inches, and of the thermometer 8°.

The feeling of hunger was very strong on this day, and I experienced a good deal of debility. Both the hunger and weakness became less a short time after eating, but they soon returned. The pains in the abdomen still continued. They became more severe

fter eating. Two evacuations of the bowels occurred, one at 2½ P. M., the other at 7 P.M. They were both hard, and were of a much lighter color than on the previous day. Reaction strongly acid. At night my sleep was disturbed by unpleasant dreams, and I awoke in the morning with severe headache and high fever.

The saliva was scanty, and of a slight acid reaction to litmus paper.

THIRD DAY.

INGESTA.

8 A.M.	Gum	2000	Water	10000
1 P.M.	"	2150	"	9890
5 "	"	3150	"	10230
Total	"	7300	"	30120

EGESTA.

Kidneys.

Whole quantity of urine 23721.50.

Water	23334.71	
Solids	386.79	
Urea		282.64
Uric acid		9.27
Chlorine		6.33
Sulphuric acid		6.97
Phosphoric acid		7.09
Residue		74.49

Intestines.

Whole quantity of feces 9783.56.

Water	3152.09	
Solids	6631.47	
Ether extract		10.72
Alcohol extract		9.55
Water extract		6581.40
Insoluble residue		29.80

Skin and Lungs.

Total loss from these channels 10704.94.

At 7 A.M. my pulse was 104, at 2 P.M. 112, and at 10 P.M. 110.—Mean 108.66.

At the same hours the temperature of the body was respectively 99.5°, 101°, and 101°.—Mean 100.50°.

At the end of the twenty-four hours my weight was 222.68;

showing a loss from the preceding day of .97 pound, equivalent to 6790 grains.

The mean height of the barometer was 29.264 inches, and of the thermometer 19°.

The debility and hunger were extreme on this day. There was also considerable febrile excitement, attended with heat and dryness of the skin, and headache. I was too much indisposed to read any, and the physical exercise was likewise reduced. In the afternoon, I was obliged to lie down, and at that time slept about one hour.

Three operations from the bowels occurred, one at 12 M., one at 4½ P.M., and one at 7½ P.M. The feces were very solid, and of a light clay color. I was very much annoyed by the abdominal pains. At night I was restless, and slept but little. In the morning, awoke feverish, and unrefreshed.

FOURTH DAY.

INGESTA.

8 A.M.	Gum	. . .	2000	Water . . .	9000
1 P.M.	"	. . .	2400	" . . .	9500
5 "	"	. . .	2500	" . .	11500
Total	"	. . .	6900	" . .	30000

EGESTA.

Kidneys.

Whole quantity of urine 20516.31.

Water	20163.88	
Solids	352.43	
Urea		274.50
Uric acid		9.35
Chlorine		3.20
Sulphuric acid		3.90
Phosphoric acid . . .		4.55
Residue		56.93

Intestines.

Whole quantity of feces 10964.73.

Water	3529.71	
Solids	7435.02	
Ether extract		10.14
Alcohol extract . . .		8.30
Water extract		7390.10
Insoluble residue . . .		26.48

Skin and Lungs.

Total loss by these channels 12656.45.

At 7 A.M. on this day my pulse was 102, at 2 P.M. 99, and at 10 P.M. 108.—Mean 103.

At the corresponding hours, the temperature of the body was respectively 97.5°, 98°, and 97.5°.—Mean 97.66°.

Perceiving that I should not be able to continue the investigations after this day, I abstracted at 3 P.M., 1272.51 grains of blood from the median basilic vein. The analysis yielded the following results:—

1000 parts of serum—		1000 parts of blood—	
Water	912.84	Water	784.35
Solids	87.16	Solids	215.65
Albumen	72.40	Fibrin	2.71
Extractive	8.23	Blood-corpuscles	135.64
Soluble salts	5.11	Albumen	62.20
	85.74	Extractive	7.39
Difference	1.42	Soluble salts	4.01
			211.95
		Difference	3.70

The whole quantity of inorganic salts in 1000 parts of serum was 6.89.

The whole quantity of inorganic salts in 1000 parts of blood was 6.37. 1000 parts of defibrinated blood contained 1.80 of fat.

The weight of the body, at the end of the twenty-four hours, was 221.63 pounds; a loss, therefore, of 1.05 pound, or 7350 grains; of which, 1272.51 are accounted for by the blood abstracted, so that there remain 6077.49 grains as the loss by the excretions.

The mean heights of the barometer and thermometer were respectively 29.369 inches, and 8°.

The hunger, debility, and febrile excitement were very great on this day; but not more so than on the previous day. The pains in the abdomen were severe, and lasted nearly the whole period of twenty-four hours. There was also some tenderness of the abdomen on pressure. Eating the gum failed now to relieve, even for a short time, the sensation of hunger. Four evacuations occurred from the intestinal canal; one at 11 A. M., one at 3 P. M., one at 9 P. M., and the other at the regular hour. All were very solid, and of a light clay color. It required a good deal of straining to eject the feces. I omitted all study on this day, and took but a trifling amount of physical exercise. The greater part of the afternoon was passed in bed. At night, I did not sleep at all well.

Fearful of inducing disease if I persevered with the experiments, and also what was perhaps a more powerful inducement, unable longer to refrain from other food, I discontinued them at the end of this day.

About 4 P. M. of the fifth day from the commencement I felt great weight and pain in the rectum, but was unable to pass anything at stool. I therefore took an enema of warm water, and in a few minutes ejected a large quantity of hard fecal matter streaked with blood. The water extract of this amounted to 3352.45 grains. No other examination of the excrement was made.

I felt very much indisposed for several days after the conclusion of the researches, but by care, and prudence in diet, no very untoward result ensued.

The results of this series are contained in the accompanying table:—

TABLE VIII.

	1st day.	2d day.	3d day.	4th day.	Total.	Mean.
INGESTA.						
Gum	8300	7250	7300	6900	29750	7437.50
Water	29000	29350	30120	30000	118470	29617.50
Total	37300	36600	37420	36900	148220	37055.00
EGESTA.						
Kidneys—						
Whole quantity urine	20728.61	21385.97	23721.50	20516.31	86152.39	21538.09
Water	20157.03	20934.74	23334.71	20163.88	84390.36	21097.59
Solids	571.58	451.23	386.79	352.43	1762.03	440.50
Urea	330.15	301.24	282.64	274.50	1188.53	297.13
Uric acids	7.45	8.20	9.27	9.35	35.27	8.81
Chlorine	46.28	21.15	6.33	3.20	76.96	19.21
Sulphuric acid	21.57	12.05	6.97	3.90	44.49	11.12
Phosphoric acid	24.13	13.35	7.09	4.55	49.12	12.28
Residue	142.00	95.24	74.49	56.93	288.66	67.16
Intestines—						
Whole quantity feces	8529.14	9350.28	9783.56	10964.73	38627.73	9656.93
Water	3284.34	3975.09	3152.09	3529.71	13941.23	3485.30
Solids	5244.80	5375.19	6631.47	7435.02	24686.50	6171.62
Ether extract	31.55	17.43	10.72	10.14	79.84	19.96
Alcohol extract	30.27	12.84	9.55	8.30	60.96	15.24
Water extract	5030.36	5297.62	6581.40	7390.10	24299.48	6074.87
Insoluble residue	152.62	47.20	29.80	26.48	255.10	63.71
Skin and Lungs—						
Total loss by these channels	12422.94	11883.75	10704.94	11496.45	47668.08	11917.02
Total egesta	41880.59	42620.00	44210.00	42977.49	171688.08	42922.02
Variation in weight	—4380.59	—6020.00	—6790.00	—6077.49	—23268.18	—5817.04
Pulse	84.33	90	108.66	103	...	96.49
Temperature of body	98°	97.33°	100.50°	97.66°	...	98.37°
Barometer	28.324	28.706	29.264	29.369	...	28.915
Thermometer	31.33°	8°	19°	8°	...	16.58°

In considering these investigations, it is seen that the following effects ensued:—

Kidneys.—The whole quantity of urine and the proportion of water were increased; the solids and amounts of each constituent were very much reduced.

Intestines.—The whole quantity of feces, the water, solids, and water extract were enormously increased over the normal average and the means of either of the other series of researches. The ether and alcohol extracts were decreased in quantity.

Skin and Lungs.—The loss from these sources was less than under either the albumen or starch series, and was probably also below the normal extent.

The loss of weight in the body was very great.

The pulse was increased in frequency, as was also the temperature of the body.

The following table shows the alterations induced in the composition of the blood:—

TABLE IX.

1000 parts of serum—	1st day.	4th day.	1000 parts of blood—	1st day.	4th day.
Water	907.43	912.84	Water	778.04	784.35
Solids	92.57	87.16	Solids	221.96	215.65
Albumen	77.36	72.46	Fibrin	2.05	2.71
Extractive	5.15	8.23	Blood-corpuscles	138.22	135.64
Soluble salts	9.22	5.11	Albumen	66.32	62.20
Inorganic salts	11.01	6.89	Extractive	4.08	7.39
			Inorganic salts	10.40	6.37
			Fat	2.13	1.80

From this table it appears that in the serum the proportion of water was augmented, and that of the solids was diminished, and that the albumen and salts were reduced in amount, and the extractive increased. In the whole blood, the same effects ensued with the addition that there was a slight increase in the amount of fibrin, and a decrease in the blood-corpuscles and fat.

It is evident from these researches that but little, if any, of the gum taken into the stomach was absorbed into the circulation. In all, 29,750 grains of gum were ingested. The water extract of the feces, which consisted almost entirely of gum, amounted during the four days of the investigations to 24,299.48 grains. To this sum should of course be added the water extract obtained the day after

the conclusion of the experiments (3352.45 grains), making a total of 27,651.93 grains, which, with the exception of very small quantities of other matters, consisted entirely of gum. A balance of 2098.07 grains remains, but it is probable that a considerable portion, if not the whole of this, was subsequently passed from the bowels, as hard lumps continued to be discharged from this channel for several days.

The great loss of weight (nearly 3.33 pounds) is not surprising after a knowledge of the above facts. Water was always taken in such quantities as desired, or of course the decrease of weight would have been much greater. The fever, hot skin, &c., were indicative of irritation and debility.

If we admit the non-absorption of the gum, the solid constituents of the urine must have been entirely derived from the effete tissues of the body. The amounts of each are therefore probably such as would have been excreted had no food been taken into the stomach. The carbonic acid of the expired air could have had no other source than the oxidation of the fat of the body, which also furnished a portion of the aqueous vapor expired.

The alterations in the proportions of the several constituents of the blood are also doubtless such as would have taken place under inanition. The increase observed in the quantity of extractive and fibrin is important, but may have been accidental.

From these researches I conclude that gum, so far from having any value as an alimentary substance, is positively injurious, owing to the fact of its clogging the intestines, and thus proving a cause of irritation. As an article of food for the sick, its use should be especially condemned.

In order to facilitate comparison of the results of the several foregoing series of experiments, the following table of the means of each course is subjoined:—

TABLE X.

	Ordinary diet.	Albumen.	Starch.	Gum.
INGESTA.				
Solid	...	8343.20	10357.50	7437.50
Water	...	24598.80	26567.60	29617.50
Total	...	32942.00	36865.10	37055.00
EGESTA.				
Kidneys—				
Whole quantity of urine	20898.71	17738.50	18427.67	21538.09
Water	19801.13	16919.62	17910.69	21097.59
Solids	1097.58	988.87	516.98	440.50
Urea	694.63	715.19	215.35	297.13
Uric acid	11.67	20.76	7.53	8.81
Chlorine	138.13	8.86	16.71	19.21
Sulphuric acid	45.18	16 92	9.73	11.12
Phosphoric acid	55.85	22.04	13.66	12.28
Residue	194.37	215.19	252.86	67.16
Intestines—				
Whole quantity of feces	2293.92	3558.36	1107.80	9656.93
Water	1673.99	2968.35	886.21	3485.30
Solids	619.92	590.02	221.59	6171.62
Ether extract	90.60	13.65	36.30	19.96
Alcohol extract	95.56	114.58	31.65	15.24
Water extract	129.55	102.35	22.69	6074.87
Insoluble residue	303.18	358.94	130.95	63.71
Skin and Lungs—				
Total loss by these channels	...	14475.65	17348.54	11917.02
Total egesta	...	35841.42	36879.07	42922.02
Variation in weight[1]	...	—28994.20	—4697.00	—5817.04
Pulse	84.23	91.83	87.42	96.49
Temperature of body	97.83°	97.39°	98.81°	98.37°
Barometer	...	29.139	29.253	28.915
Thermometer	...	40.41°	6.03°	16.58°

Résumé.

From the preceding investigations, I think the following conclusions (several of which, however, are already well established) fairly deducible, and applicable to the human subject:—

1. That albumen may be assimilated into the system in such quantity as to furnish a sufficiency of both nitrogen and carbon to the organism.

2. That under the use of an exclusively albuminous diet the nitrogenous constituents of the urine are increased over the ordi-

[1] Owing to neglect to ascertain the weight of the body before commencing the preliminary series of experiments, the mean variation cannot be given.

nary average amounts, though not in proportion to the quantity of albumen absorbed into the circulation.

3. That either some other means than the urine exist for the elimination of nitrogen from the system, or the excess (over two-thirds) is retained in the organism, even when the body is rapidly decreasing in weight.

4. That the continued use of albumen as an article of food increases the proportion of this substance (and of fibrin) in the blood, and in a short time causes it to appear in the urine.

5. That whilst pure albumen cannot be regarded as of itself adequate to supply the several wants of the system, there is no reason why, when associated with suitable inorganic matters, it should not support both life and health.

6. That starch can be assimilated by the absorbents in more than sufficient quantity to sustain the respiratory function.

7. That under its use the nitrogenous constituents of the urine are very much reduced in amount, even below what would probably occur during inanition, and, that although starch is not capable of nourishing the tissues, it is yet serviceable, aside from its heat producing power, in retarding their destructive metamorphosis.

8. That the continued use of highly amylaceous food causes the appearance of sugar in the urine.

9. That under the use of such aliments the nitrogenous constituents of the blood are diminished, and the carbonaceous increased.

10. That gum is altogether incapable of assimilation, and therefore possesses no calorifacient or nutritive power whatever, but is, on the contrary, a source of irritation to the digestive organs.

11. That in consequence of the above fact, the solids of the urine during the immediately preceding researches, were entirely derived from the waste of the tissues of the body, and the carbon exhaled by the lungs from the consumption of its fat.

12. That gum, when exclusively used as food, from the irritation it causes in the intestinal canal, and the fact of its non-assimilation, induces more constitutional disturbance than either starch or albumen, and that under a similar condition starch is more productive of ill consequences than albumen.

The investigations which it was the special object of this memoir to detail, are now concluded, and are respectfully submitted to the Association.

In an essay of this character, whose chief aim is to add to the sum of knowledge, the labors of others could at most receive but a slight notice, and must of necessity frequently be passed over without even a word of recognition. Yet no one appreciates more highly than myself the self-devotion and constant striving to enlarge the bounds of science, which animate so many physiologists of the present day, and which have already yielded such brilliant results. Had I, however, attempted to do justice to even a tithe of their contributions, I should have converted this memoir into a treatise, and might have lost sight of all originality in my efforts to make a successful compilation. With what success I have prosecuted these inquiries is not for me to determine. I cannot, however, think them valueless, for, if they only excite others throughout our land to investigate in living beings the operations of nature, they will still be beneficial to the cause of that science which constitutes the basis of all medical knowledge. From the united labors of those who seek by original investigations to build up a positive science, where there is yet so much darkness and uncertainty, what may we not expect? May we not confidently look forward to the perfect enlightenment of our minds in regard to the most obscure of the vital processes? Though we may often be led astray by experiments conducted without due care, and with insufficient knowledge, they yet afford the only means by which we can successfully work out the sublime problems which the Great Creator of all has proposed for our solution.

PLAN OF ORGANIZATION

OF THE

AMERICAN MEDICAL ASSOCIATION.

PLAN OF ORGANIZATION.

REGULATIONS.

I. TITLE OF THE ASSOCIATION.

THIS institution shall be known and distinguished by the name and title of "THE AMERICAN MEDICAL ASSOCIATION."

II. MEMBERS.

The members of this institution shall collectively represent and have cognizance of the common interests of the medical profession in every part of the United States; and shall hold their appointment to membership either as delegates from local institutions, as members by invitation, or as permanent members.

The Delegates shall receive the appointment from permanently organized medical societies, medical colleges, hospitals, lunatic asylums, and other permanently organized medical institutions of good standing in the United States, and from the American Medical Society of Paris. Each delegate shall hold his appointment for one year, and until another is appointed to succeed him, and shall participate in all the business and affairs of the Association.

Each local society shall have the privilege of sending to the Association one delegate for every ten of its regular resident members, and one for every additional fraction of more than half of this number. The faculty of every regular constituted medical college, or chartered school of medicine, shall have the privilege of sending two delegates. The professional staff of every chartered or municipal hospital containing a hundred inmates or more, shall have the privilege of sending two delegates; and every other permanently organized medical institution of good standing shall have the privilege of sending one delegate.

Delegates representing the medical staffs of the United States Army and Navy, shall be appointed by the Chiefs of the Army and Navy Medical Bureaux. The number of delegates so appointed shall be four from the army medical officers, and an equal number from the navy medical officers.

The Members by Invitation shall consist of practitioners of reputable standing, from sections of the United States not otherwise represented at the meeting. They shall receive their appointment by invitation of the meeting, after an introduction from any of the members present, or from any of the absent permanent members. They shall hold their connection with the Association until the close of the annual session at which they are received; and shall be entitled to participate in all its affairs, as in the case of delegates.

The Permanent Members shall consist of all those who have served in the capacity of delegates, and of such other members as may receive the appointment by unanimous vote.

Permanent members shall at all times be entitled to attend the meetings, and participate in the affairs of the Association, so long as they shall continue to conform to its regulations, but without the right of voting; and, when not in attendance, they shall be authorized to grant letters of introduction to reputable practitioners of medicine residing in their vicinity, who may wish to participate in the business of the meetings, as provided for members by invitation.

Every member elect, prior to the permanent organization of the annual meeting, or before voting on any question after the meeting has been organized, must sign these regulations, inscribing his name and address in full, specifying in what capacity he attends, and, if a delegate, the title of the institution from which he has received his appointment.

III. MEETINGS.

The regular meetings of the Association shall be held annually, and commence on the first Tuesday in May. The place of meeting shall never be the same for any two years in succession, and shall be determined for each next succeeding year by vote of the Association.

IV. OFFICERS.

The officers of the Association shall be a President, four Vice-Presidents, two Secretaries, and a Treasurer. They shall be nomi-

ated by a special committee of one member from each State represented at the meeting, and shall be elected by vote on a general ticket. Each officer shall hold his appointment for one year, and until another is elected to succeed him.

The President shall preside at the meetings, preserve order and decorum in debate, give a casting vote when necessary, and perform all the other duties that custom and parliamentary usage may require.

The Vice-Presidents, when called upon, shall assist the President in the performance of his duties, and, during the absence, or at the request of the President, one of them shall officiate in his place.

The Secretaries shall record the minutes, and authenticate the proceedings, give due notice of the time and place of each next ensuing annual meeting, and serve as members of the Committee of Publication. The Secretary first in nomination shall also preserve the archives and unpublished transactions of the Association.

The Treasurer shall have the immediate charge and management of the funds and property of the Association. He shall be a member of the Committee of Publication, to which committee he shall give bonds for the safe keeping, and proper use and disposal of his trust. And through the same committee he shall present his accounts, duly authenticated, at every regular meeting.

V. STANDING COMMITTEES.

The following standing committees, each composed of seven members, shall be organized at every annual meeting, for preparing, arranging, and expediting business for each next ensuing year, and for carrying into effect the orders of the Association not otherwise assigned—namely, a Committee of Arrangements and a Committee of Publication.

The Committee of Arrangements shall, if no sufficient reasons prevent, be mainly composed of members residing in the place at which the Association is to hold its next annual meeting; and shall be required to provide suitable accommodations for the meeting, to verify and report upon the credentials of membership, to receive and announce all essays and memoirs voluntarily communicated, either by members of the Association, or by others through them, and to determine the order in which such papers are to be read and considered.

The Committee of Publication, of which the Secretaries and Trea-

surer must constitute a part, shall have charge of preparing for the press, and of publishing and distributing such of the proceedings, transactions, and memoirs of the Association, as may be ordered to be published. The six members of this Committee, who have not the immediate management of the funds, shall also, in their own names, as agents for the Association, hold the bond of the Treasurer for the faithful execution of his office, and shall annually audit and authenticate his accounts, and present a statement of the same in the annual report of the Committee; which report shall specify the character and cost of the publications of the Association during the year, the number of copies still at the disposal of the meeting, the funds on hand for further operations, and the probable amount of the assessment to be laid on each member of the Association for covering its annual expenditures.

VI. FUNDS AND APPROPRIATIONS.

Funds shall be raised by the Association for meeting its current expenses and awards from year to year; but never with the view of creating a permanent income from investments. Funds may be obtained by an equal assessment of not more than three dollars annually, on each of the members; by individual voluntary contributions for specific objects; and by the sale and disposal of publications, or of works prepared for publication.

The funds may be appropriated for defraying the expenses of the annual meetings; for publishing the proceedings, memoirs, and transactions of the Association; for enabling the standing committees to fulfil their respective duties, conduct their correspondence, and procure the materials necessary for the completion of their stated annual reports; for the encouragement of scientific investigations, by prizes and awards of merit; and for defraying the expenses incidental to specific investigations under the instruction of the Association, where such investigations have been accompanied with an order on the Treasurer to supply the funds necessary for carrying them into effect.

VII. PROVISION FOR AMENDMENTS.

No amendment or alteration shall be made in any of these articles, except at the annual meeting next subsequent to that at which such amendment or alteration may have been proposed; and then

nly by the voice of three-fourths of all the members in attend-nce.

And, in acknowledgment of having adopted the foregoing pro-positions, and of our willingness to abide by them, and use our ndeavors to carry into effect the objects of this Association, as bove set forth—we have hereunto set our names.

NAMES OF MEMBERS.	RESIDENCE.	INSTITUTIONS REPRESENTED.

In connection with the foregoing "Plan of Organization," the following was adopted as one of the ordinances, or by-laws of the Association, viz:—

THE ORDER OF BUSINESS.

The order of business at the annual meetings of the American Medical Association shall at all times be subject to the vote of three-fourths of all the members in attendance; and, until permanently altered, except when for a time suspended, it shall be as follows, viz:—

1. The temporary organization of the meeting preparatory to the election of officers.
2. The report of the Committee of Arrangements on the credentials of members; after the latter have registered their names and addresses, and the titles of the institutions which they represent.
3. The calling of the roll.
4. The election of officers.
5. The reading of minutes.
6. The reception of members not present at the opening of the meeting, and the reading of notes from absentees.
7. The reception of members by invitation.
8. The reading and consideration of the stated annual reports from the standing committees.

9. The selection of the next place of annual meeting.

10. The new appointments to fill the standing committees.

11. The choice of permanent members by vote.

12. Resolutions introducing new business, and instructions to the permanent committees.

13. The reading and discussion of voluntary communications introduced through the Committee of Arrangements.

14. Unfinished and miscellaneous business.

15. Adjournment.

ORDINANCES.

The following *Resolutions*, adopted at different meetings of the Association, though not incorporated into the *Plan of Organization*, constitute a portion of the *Regulations* for the government of the Association.

RESOLUTIONS ADOPTED AT THE FOURTH ANNUAL MEETING, HELD IN CHARLESTON, IN 1851.

(See TRANSACTIONS, vol. iv.)

Resolved, That committees of three be appointed to investigate and report, severally, on the following subjects:—

1st. Causes of tubercular diathesis.

2d. Blending and conversion of the types of fever.

3d. The mutual relations of yellow fever and bilious remittent fever.

4th. Epidemic erysipelas.

5th. Acute and chronic diseases of the neck of the uterus.

6th. Dengue.

7th. The milk sickness so called.

8th. Endemic prevalence of tetanus.

9th. Diseases of parasitic origin.

10th. Physiological peculiarities and diseases of the Negro.

11th. The action of water on lead pipes, and the diseases which proceed from it.

12th. The alkaloids which may be substituted for quinia.

13th. Permanent cure of reducible hernia.

14th. Results of surgical operations for the relief of malignant diseases.

15th. Statistics of operations for removal of stone in the bladder.

16th. Cold water dressings.

17th. The sanitary principles applicable to the construction of dwellings.

18th. The toxicological and medicinal properties of our cryptogamic plants.

19th. Agency of the refrigeration produced through upward radiation of heat as an exciting cause of disease.

20th. Epidemic diseases of New England and New York.

21st. Epidemic diseases of Pennsylvania, New Jersey, Delaware, and Maryland.

22d. Epidemic diseases of Virginia and North Carolina.

23d. Epidemic diseases of South Carolina, Georgia, Florida, and Alabama.

24th. Epidemic diseases of Mississippi, Louisiana, Texas, and Arkansas.

25th. Epidemic diseases of Tennessee and Kentucky.

26th. Epidemic diseases of Missouri, Illinois, Iowa, and Wisconsin.

27th. Epidemic diseases of Indiana, Ohio, and Michigan.

Resolved, That a Committee on Nomination be appointed, whose duty it shall be to nominate one chairman for each of the above committees.

Resolved, That each of the chairmen thus nominated shall select, at his earliest convenience, two members of the Association, to complete the committee.

Resolved, That a committee of five members be appointed, to be called the Committee for Volunteer Communications,[1] whose duty it shall be, in the interval between the present and the next succeeding sessions, to receive papers upon any subject, from any persons who may choose to send them, to decide upon the merits of these papers, and to select for presentation to the Association, at its next session, such as they may deem worthy of being thus presented.

Resolved, That the Committee for Volunteer Communications shall have the power to form such regulations as to the mode in which the papers are to be presented, and as to the observing of secrecy, as they may think proper.

Resolved, That the selection of the members of this committee be referred to the same Nominating Committee, whose duty it will be to appoint the chairmen of the several special committees, as above directed, with this restriction, that the individuals composing it shall reside in the same neighborhood.

Resolved, That a prize of fifty dollars[2] be awarded to each of the

[1] The title of this Committee was changed by a resolution adopted at the Sixth Annual Meeting to that of "*Committee on Prize Essays.*" (See vol. vi. p. 47.)

[2] By a resolution adopted at the Fifth Annual Meeting, the number of prizes was reduced to *two*, and the amount of the prizes increased to *one hundred dollars*. (See vol. v. p. 45.)

volunteer communications reported on favorably by the Committee, and directed by the Association to be published, provided that the number to which the prize is thus awarded, do not exceed five;[1] and provided, also, if the number approved and directed to be published exceed five, that, in such case, the prize be awarded to the five which the Committee may determine to be most meritorious (pp. 36–38).

Resolved, That the Committee of Publication be instructed to print, conspicuously, at the beginning of the forthcoming volume of the *Transactions*, the following disclaimer, viz: The American Medical Association, although formally accepting and publishing the reports of the various standing committees, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when so decided by special resolution (p. 39).

RESOLUTIONS ADOPTED AT THE FIFTH ANNUAL MEETING, HELD IN RICHMOND, IN 1852.

(See TRANSACTIONS, vol. v.)

Resolved, That the special committees on Medical Education, and Medical Literature, be appointed, consisting each of five members, and that the Nominating Committee be instructed to nominate such committees to this Association (p. 32).

Resolved, That instead of awarding five prizes of $50 each, annually, the Association hereafter grant two prizes of $100 each, for the two best essays (p. 45).

RESOLUTIONS ADOPTED AT THE SIXTH ANNUAL MEETING, HELD IN NEW YORK, IN 1853.

(See TRANSACTIONS, vol. vi.)

Resolved, That the Committee of Publication have power to furnish the chairman of committees on epidemics with extra copies of their reports, respectively, at the expense of the Association—the said extra copies not to exceed one hundred (p. 28).

Resolved, That the name of the Committee on Volunteer Communications be changed to that of Committee on Prize Essays (p. 47).

[1] See note preceding page.

RESOLUTIONS ADOPTED AT THE SEVENTH MEETING. HELD IN ST. LOUIS.

(See TRANSACTIONS, vol. vii.).

Resolved, That the sum of three dollars, annually, be assessed upon each of the delegates to the sessions of the Association, as well as upon each of its permanent members, for the purpose of raising a fund to defray the expenses of printing the *Transactions*. The payment of this assessment shall be required of the delegates and members in attendance upon the sessions of the Association, previously to their taking their seats and participating in the business of the session; and of all others on or before the first of September in each year.

Resolved, That each delegate and member who has paid his annual assessment, in accordance with the terms of the above resolution, shall be entitled to receive a copy of the printed *Transactions* of the session.

Resolved, That the name of no one shall be inserted or continued on the list of permanent members of the Association who shall refuse or neglect to pay his annual assessment, in accordance with the terms of the first resolution, but it shall be the duty of the Treasurer, before erasing the name of any member, to issue a circular informing him of his indebtedness.

Resolved, That it shall be the duty of the Committee of Publication to fix the price at which the printed *Transactions* of each session will be furnished to others than delegates and members; provided, that in no case shall the said price be less than three dollars.

Resolved, That the delegates to the Association be requested to appoint committees, at one or more central points within their respective States, for the purpose of aiding the Committee of Publication in procuring subscribers, and in distributing the printed volumes of *Transactions* to said subscribers, as well as to the members of the Association residing within the neighborhood of the said committees, respectively (p. 22).

Resolved, That a standing committee be appointed by this Association to procure memorials of the eminent and worthy dead among the distinguished physicians of our country, and present them to this Association for publication in their *Transactions* (p. 30).

Resolved, That a standing committee of ——— members be appointed by this Association, on the subject of Insanity, as it pre-

rails in this country, including its causation—as hereditary transmission; educational influences—physical and moral, social and political institutions, &c.; its forms and complications; curability; means of prevention, &c. (p. 32).

Resolved, That it shall be the duty of the Publication Committee to append to each volume of the *Transactions*, hereafter published, a copy of the Constitution of the Association (p. 34).

Resolved, That, hereafter, every paper received by this Association and ordered to be published, and all plates or other means of illustration, shall be considered the exclusive property of the Association, and shall be published and sold for the exclusive benefit of the Association (p. 40).

Resolved, That, hereafter, the majority of the Committee of Publication shall be selected from the physicians of that city in which this Association may hold its annual session (p. 41).

Resolved, That it is the duty of every member of this Association, who learns that any existing medical school departs from the published conditions of graduation, to report the fact at the annual meetings; and that, on proof of the fact, such school shall be deprived of its representation in this body (p. 43).

RESOLUTIONS ADOPTED AT THE EIGHTH MEETING, HELD IN PHILADELPHIA, 1855.

(See TRANSACTIONS, vol. viii.)

Resolved, That no permanent member who is not present at a meeting of the Association, shall be required to pay the annual assessment; but no such permanent member shall be entitled to receive a copy of the printed *Transactions* unless he pay into the treasury a sum not less than the annual assessment paid by the delegates and permanent members in attendance; and that all the names of permanent members that have been left off the published list, be reinserted therein in the next volume of *Transactions*.

Resolved, That no assessment whatever shall be made against members by invitation, but that they also shall be entitled to a copy of the printed *Transactions*, by paying the sum assessed upon delegates in attendance (p. 29).

Resolved, That, hereafter, beginning with the session for 1856, no report or other paper shall be entitled to publication in the volume for the year in which it shall be presented to the Association,

unless it be placed in the hands of the Committee of Publication on or before the first of June (p. 36).

Resolved, That this Association appoint a special committee for each State and Territory represented, of —— members, whose duty it shall be to report upon its medical topography, epidemic diseases, and the most successful treatment thereof, and that the same shall continue to hold their office for three years.

Resolved, That, as other States and Territories, not now represented, become so by delegates duly appointed to this National Association, similar committees shall be appointed for like purposes, and that they also shall hold their office for three years.

Resolved, That in the appointment of gentlemen of education and experience in the affairs of their own State, we have the best guarantee that the important objects we seek will be more satisfactorily accomplished, and the profession as well as the public interest thereby better served.

Resolved, That the committees heretofore appointed by this Association, at its session in Charleston, for a similar object, be and the same are hereby discharged.

Resolved, That no State or local society shall hereafter be entitled to representation in this Association, that has not adopted its Code of Ethics.

Resolved, That no State or local society that has intentionally violated or disregarded any article or clause in the Code of Ethics, shall any longer be entitled to representation in this body (p. 56).

Resolved, That no organization or institution, entitled to representation in this Association, shall be considered in good standing, which has not adopted its Code of Ethics (p. 60).

RESOLUTIONS ADOPTED AT THE NINTH MEETING, HELD IN DETROIT, 1856.

(See TRANSACTIONS, vol. ix.)

Resolved, That the resolutions adopted by the Association at its session in St. Louis, in 1854, requiring the Committee of Publication to be selected from the place where the meeting should be held, be repealed (p. 24).

Resolved, That no one be permitted to address the Association, except he shall have first given his name and residence, which shall be distinctly announced from the Chair, and the member be required

to go forward and speak from the stand, and not more than ten minutes at one time (p. 24).

Resolved, That the President shall be authorized annually to appoint delegates to represent this Association at the meetings of the British Association, the American Medical Society at Paris, and such other scientific bodies in Europe as may be affiliated with us (p. 30).

Resolved, That all voluntary communications hereafter presented to the Association, shall be referred to a special committee of ——, to be appointed by the President on the first day of each annual meeting, whose duty it shall be to examine such communications, and report upon the propriety of the presentation and reference to the Committee of Publication (p. 40).

Resolved, That any new Medical Institution not heretofore represented in this body, be required to transmit to the Secretary, with the credentials of its delegates, evidence of its existence, capacity, and good standing (p. 42).

RESOLUTION ADOPTED AT THE TENTH MEETING, HELD IN NASHVILLE, 1857.

(See TRANSACTIONS, vol. x.)

Resolved, That the Committee of Publication be instructed to append the Code of Ethics of the American Medical Association to each volume of its present and future annual *Transactions*.

CODE OF ETHICS

OF THE

AMERICAN MEDICAL ASSOCIATION,

ADOPTED MAY 1847.

CODE OF MEDICAL ETHICS.

OF THE DUTIES OF PHYSICIANS TO THEIR PATIENTS, AND OF THE OBLIGATIONS OF PATIENTS TO THEIR PHYSICIANS.

ART. I.—*Duties of physicians to their patients.*

§ 1. A physician should not only be ever ready to obey the calls of the sick, but his mind ought also to be imbued with the greatness of his mission, and the responsibility he habitually incurs in its discharge. Those obligations are the more deep and enduring, because there is no tribunal other than his own conscience to adjudge penalties for carelessness or neglect. Physicians should, therefore, minister to the sick with due impressions of the importance of their office; reflecting that the ease, the health, and the lives of those committed to their charge, depend on their skill, attention, and fidelity. They should study, also, in their deportment, so to unite *tenderness* with *firmness*, and *condescension* with *authority*, as to inspire the minds of their patients with gratitude, respect, and confidence.

§ 2. Every case committed to the charge of a physician should be treated with attention, steadiness, and humanity. Reasonable indulgence should be granted to the mental imbecility and caprices of the sick. Secrecy and delicacy, when required by peculiar circumstances, should be strictly observed; and the familiar and confidential intercourse to which physicians are admitted in their professional visits, should be used with discretion, and with the most scrupulous regard to fidelity and honor. The obligation of secrecy extends beyond the period of professional services;—none of the privacies of personal and domestic life, no infirmity of disposition or flaw of character observed during professional attendance, should ever be divulged by the physician, except when he is imperatively

required to do so. The force and necessity of this obligation are indeed so great, that professional men have, under certain circumstances, been protected in their observance of secrecy by courts of justice.

§ 3. Frequent visits to the sick are in general requisite, since they enable the physician to arrive at a more perfect knowledge of the disease—to meet promptly every change which may occur, and also tend to preserve the confidence of the patient. But unnecessary visits are to be avoided, as they give useless anxiety to the patient, tend to diminish the authority of the physician, and render him liable to be suspected of interested motives.

§ 4. A physician should not be forward to make gloomy prognostications, because they savor of empiricism, by magnifying the importance of his services in the treatment or cure of the disease. But he should not fail, on proper occasions, to give to the friends of the patient timely notice of danger when it really occurs; and even to the patient himself, if absolutely necessary. This office, however, is so peculiarly alarming when executed by him, that it ought to be declined whenever it can be assigned to any other person of sufficient judgment and delicacy. For, the physician should be the minister of hope and comfort to the sick; that, by such cordials to the drooping spirit, he may smooth the bed of death, revive expiring life, and counteract the depressing influence of those maladies which often disturb the tranquillity of the most resigned in their last moments. The life of a sick person can be shortened not only by the acts, but also by the words or the manner of a physician. It is, therefore, a sacred duty to guard himself carefully in this respect, and to avoid all things which have a tendency to discourage the patient and to depress his spirits.

§ 5. A physician ought not to abandon a patient because the case is deemed incurable; for his attendance may continue to be highly useful to the patient, and comforting to the relatives around him, even in the last period of a fatal malady, by alleviating pain and other symptoms, and by soothing mental anguish. To decline attendance, under such circumstances, would be sacrificing to fanciful delicacy and mistaken liberality, that moral duty, which is independent of, and far superior to, all pecuniary consideration.

§ 6. Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and more enlarged views in practice.

§ 7. The opportunity which a physician not unfrequently enjoys

of promoting and strengthening the good resolutions of his patients, suffering under the consequences of vicious conduct, ought never to be neglected. His counsels, or even remonstrances, will give satisfaction, not offence, if they be proffered with politeness, and evince a genuine love of virtue, accompanied by a sincere interest in the welfare of the person to whom they are addressed.

ART. II.—*Obligations of patients to their physicians.*

§ 1. The members of the medical profession, upon whom is enjoined the performance of so many important and arduous duties towards the community, and who are required to make so many sacrifices of comfort, ease, and health, for the welfare of those who avail themselves of their services, certainly have a right to expect and require, that their patients should entertain a just sense of the duties which they owe to their medical attendants.

§ 2. The first duty of a patient is, to select as his medical adviser one who has received a regular professional education. In no trade or occupation, do mankind rely on the skill of an untaught artist; and in medicine, confessedly the most difficult and intricate of the sciences, the world ought not to suppose that knowledge is intuitive.

§ 3. Patients should prefer a physician whose habits of life are regular, and who is not devoted to company, pleasure, or to any pursuit incompatible with his professional obligations. A patient should, also, confide the care of himself and family, as much as possible, to one physician; for a medical man who has become acquainted with the peculiarities of constitution, habits, and predispositions, of those he attends, is more likely to be successful in his treatment than one who does not possess that knowledge.

A patient who has thus selected his physician, should always apply for advice in what may appear to him trivial cases, for the most fatal results often supervene on the slightest accidents. It is of still more importance that he should apply for assistance in the forming stage of violent diseases; it is to a neglect of this precept that medicine owes much of the uncertainty and imperfection with which it has been reproached.

§ 4. Patients should faithfully and unreservedly communicate to their physician the supposed cause of their disease. This is the more important, as many diseases of a mental origin simulate those depending on external causes, and yet are only to be cured by ministering to the mind diseased. A patient should never be afraid of thus making his physician his friend and adviser; he should

always bear in mind that a medical man is under the strongest obligations of secrecy. Even the female sex should never allow feelings of shame or delicacy to prevent their disclosing the seat, symptoms, and causes of complaints peculiar to them. However commendable a modest reserve may be in the common occurrences of life, its strict observance in medicine is often attended with the most serious consequences, and a patient may sink under a painful and loathsome disease, which might have been readily prevented had timely intimation been given to the physician.

§ 5. A patient should never weary his physician with a tedious detail of events or matters not appertaining to his disease. Even as relates to his actual symptoms, he will convey much more real information by giving clear answers to interrogatories, than by the most minute account of his own framing. Neither should he obtrude upon his physician the details of his business nor the history of his family concerns.

§ 6. The obedience of a patient to the prescriptions of his physician should be prompt and implicit. He should never permit his own crude opinions as to their fitness, to influence his attention to them. A failure in one particular may render an otherwise judicious treatment dangerous, and even fatal. This remark is equally applicable to diet, drink, and exercise. As patients become convalescent, they are very apt to suppose that the rules prescribed for them may be disregarded, and the consequence, but too often, is a relapse. Patients should never allow themselves to be persuaded to take any medicine whatever, that may be recommended to them by the self-constituted doctors and doctresses, who are so frequently met with, and who pretend to possess infallible remedies for the cure of every disease. However simple some of their prescriptions may appear to be, it often happens that they are productive of much mischief, and in all cases they are injurious, by contravening the plan of treatment adopted by the physician.

§ 7. A patient should, if possible, avoid even the *friendly visits of a physician* who is not attending him—and when he does receive them, he should never converse on the subject of his disease, as an observation may be made, without any intention of interference, which may destroy his confidence in the course he is pursuing, and induce him to neglect the directions prescribed to him. A patient should never send for a consulting physician without the express consent of his own medical attendant. It is of great importance that physicians should act in concert; for, although their modes of

treatment may be attended with equal success when employed singly, yet conjointly they are very likely to be productive of disastrous results.

§ 8. When a patient wishes to dismiss his physician, justice and common courtesy require that he should declare his reasons for so doing.

§ 9. Patients should always, when practicable, send for their physician in the morning, before his usual hour of going out; for, by being early aware of the visits he has to pay during the day, the physician is able to apportion his time in such a manner as to prevent an interference of engagements. Patients should also avoid calling on their medical adviser unnecessarily during the hours devoted to meals or sleep. They should always be in readiness to receive the visits of their physician, as the detention of a few minutes is often of serious inconvenience to him.

§ 10. A patient should, after his recovery, entertain a just and enduring sense of the value of the services rendered him by his physician; for these are of such a character, that no mere pecuniary acknowledgment can repay or cancel them.

OF THE DUTIES OF PHYSICIANS TO EACH OTHER, AND TO THE PROFESSION AT LARGE.

ART. I.—*Duties for the support of professional character.*

§ 1. Every individual, on entering the profession, as he becomes thereby entitled to all its privileges and immunities, incurs an obligation to exert his best abilities to maintain its dignity and honor, to exalt its standing, and to extend the bounds of its usefulness. He should, therefore, observe strictly, such laws as are instituted for the government of its members;—should avoid all contumelious and sarcastic remarks relative to the faculty, as a body; and while, by unwearied diligence, he resorts to every honorable means of enriching the science, he should entertain a due respect for his seniors, who have, by their labors, brought it to the elevated condition in which he finds it.

§ 2. There is no profession, from the members of which greater purity of character, and a higher standard of moral excellence are required, than the medical; and to attain such eminence, is a duty every physician owes alike to his profession and to his patients. It is due to the latter, as without it he cannot command their respect and confidence, and to both, because no scientific attainments can

compensate for want of correct moral principles. It is also incumbent upon the faculty to be temperate in all things, for the practice of physic requires the unremitting exercise of a clear and vigorous understanding; and, on emergencies, for which no professional man should be unprepared, a steady hand, an acute eye, and an unclouded head may be essential to the well-being, and even to the life, of a fellow creature.

§ 3. It is derogatory to the dignity of the profession to resort to public advertisements, or private cards, or handbills, inviting the attention of individuals affected with particular diseases—publicly offering advice and medicine to the poor gratis, or promising radical cures; or to publish cases and operations in the daily prints, or suffer such publications to be made; to invite laymen to be present at operations, to boast of cures and remedies, to adduce certificates of skill and success, or to perform any other similar acts. These are the ordinary practices of empirics, and are highly reprehensible in a regular physician.

§ 4. Equally derogatory to professional character is it, for a physician to hold a patent for any surgical instrument or medicine; or to dispense a secret *nostrum*, whether it be the composition or exclusive property of himself or of others. For, if such nostrum be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality; and, if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice. It is also reprehensible for physicians to give certificates attesting the efficacy of patent or secret medicines, or in any way to promote the use of them.

ART. II.—*Professional services of physicians to each other.*

§ 1. All practitioners of medicine, their wives, and their children while under the paternal care, are entitled to the gratuitous services of any one or more of the faculty residing near them, whose assistance may be desired. A physician afflicted with disease is usually an incompetent judge of his own case; and the natural anxiety and solicitude which he experiences at the sickness of a wife, a child, or any one who, by the ties of consanguinity, is rendered peculiarly dear to him, tend to obscure his judgment, and produce timidity and irresolution in his practice. Under such circumstances, medical men are peculiarly dependent upon each other, and kind offices and professional aid should always be cheerfully and gratuitously afforded. Visits ought not, however, to be ob-

traded officiously; as such unasked civility may give rise to embarrassment, or interfere with that choice on which confidence depends. But, if a distant member of the faculty, whose circumstances are affluent, request attendance, and an honorarium be offered, it should not be declined; for no pecuniary obligation ought to be imposed, which the party receiving it would wish not to incur.

ART. III.—*Of the duties of physicians as respects vicarious offices.*

§ 1. The affairs of life, the pursuit of health, and the various accidents and contingencies to which a medical man is peculiarly exposed, sometimes require him temporarily to withdraw from his duties to his patients, and to request some of his professional brethren to officiate for him. Compliance with this request is an act of courtesy, which should always be performed with the utmost consideration for the interest and character of the family physician, and when exercised for a short period, all the pecuniary obligations for such service should be awarded to him. But if a member of the profession neglect his business in quest of pleasure and amusement, he cannot be considered as entitled to the advantages of the frequent and long-continued exercise of this fraternal courtesy, without awarding to the physician who officiates the fees arising from the discharge of his professional duties.

In obstetrical and important surgical cases, which give rise to unusual fatigue, anxiety, and responsibility, it is just that the fees accruing therefrom should be awarded to the physician who officiates.

ART. IV.—*Of the duties of physicians in regard to consultations.*

§ 1. A regular medical education furnishes the only presumptive evidence of professional abilities and acquirements, and ought to be the only acknowledged right of an individual to the exercise and honors of his profession. Nevertheless, as in consultations the good of the patient is the sole object in view, and this is often dependent on personal confidence, no intelligent regular practitioner, who has a license to practice from some medical board of known and acknowledged respectability, recognized by this association, and who is in good moral and professional standing in the place in which he resides, should be fastidiously excluded from fellowship, or his aid refused in consultation, when it is requested by the patient. But no one can be considered as a regular practitioner or a

fit associate in consultation, whose practice is based on an exclusive dogma, to the rejection of the accumulated experience of the profession, and of the aids actually furnished by anatomy, physiology, pathology, and organic chemistry.

§ 2. In consultations, no rivalship or jealousy should be indulged; candor, probity, and all due respect should be exercised towards the physician having charge of the case.

§ 3. In consultations, the attending physician should be the first to propose the necessary questions to the sick; after which the consulting physician should have the opportunity to make such farther inquiries of the patient as may be necessary to satisfy him of the true character of the case. Both physicians should then retire to a private place for deliberation; and the one first in attendance should communicate the directions agreed upon to the patient or his friends, as well as any opinions which it may be thought proper to express. But no statement or discussion of it should take place before the patient or his friends, except in the presence of all the faculty attending, and by their common consent; and no *opinions* or *prognostications* should be delivered, which are not the result of previous deliberation and concurrence.

§ 4. In consultations, the physician in attendance should deliver his opinion first; and when there are several consulting, they should deliver their opinions in the order in which they have been called in. No decision, however, should restrain the attending physician from making such variations in the mode of treatment, as any subsequent unexpected change in the character of the case may demand. But such variation, and the reasons for it, ought to be carefully detailed at the next meeting in consultation. The same privilege belongs also to the consulting physician if he is sent for in an emergency, when the regular attendant is out of the way, and similar explanations must be made by him at the next consultation.

§ 5. The utmost punctuality should be observed in the visits of physicians when they are to hold consultation together, and this is generally practicable, for society has been considerate enough to allow the plea of a professional engagement to take precedence of all others, and to be an ample reason for the relinquishment of any present occupation. But, as professional engagements may sometimes interfere, and delay one of the parties, the physician who first arrives should wait for his associate a reasonable period, after which the consultation should be considered as postponed to

a new appointment. If it be the attending physician who is present, he will of course see the patient and prescribe; but if it be the consulting one, he should retire, except in case of emergency, or when he has been called from a considerable distance, in which latter case he may examine the patient, and give his opinion in *writing*, and *under seal*, to be delivered to his associate.

§ 6. In consultations, theoretical discussions should be avoided, as occasioning perplexity and loss of time. For there may be much diversity of opinion concerning speculative points, with perfect agreement in those modes of practice which are founded, not on hypothesis, but on experience and observation.

§ 7. All discussions in consultation should be held as secret and confidential. Neither by words nor manner should any of the parties to a consultation assert or insinuate, that any part of the treatment pursued did not receive his assent. The responsibility must be equally divided between the medical attendants—they must equally share the credit of success as well as the blame of failure.

§ 8. Should an irreconcilable diversity of opinion occur when several physicians are called upon to consult together, the opinion of the majority should be considered as decisive; but if the numbers be equal on each side, then the decision should rest with the attending physician. It may, moreover, sometimes happen, that two physicians cannot agree in their views of the nature of a case, and the treatment to be pursued. This is a circumstance much to be deplored, and should always be avoided, if possible, by mutual concessions, as far as they can be justified by a conscientious regard for the dictates of judgment. But, in the event of its occurrence, a third physician should, if practicable, be called to act as umpire; and, if circumstances prevent the adoption of this course, it must be left to the patient to select the physician in whom he is most willing to confide. But, as every physician relies upon the rectitude of his judgment, he should, when left in the minority, politely and consistently retire from any farther deliberation in the consultation, or participation in the management of the case.

§ 9. As circumstances sometimes occur to render a *special consultation* desirable, when the continued attendance of two physicians might be objectionable to the patient, the member of the faculty whose assistance is required in such cases, should sedulously guard against all future unsolicited attendance. As such consultations

require an extraordinary portion both of time and attention, at least a double honorarium may be reasonably expected.

§ 10. A physician who is called upon to consult, should observe the most honorable and scrupulous regard for the character and standing of the practitioner in attendance; the practice of the latter, if necessary, should be justified as far as it can be, consistently with a conscientious regard for truth, and no hint or insinuation should be thrown out which could impair the confidence reposed in him, or affect his reputation. The consulting physician should also carefully refrain from any of those extraordinary attentions or assiduities, which are too often practised by the dishonest for the base purpose of gaining applause, or ingratiating themselves into the favor of families and individuals.

ART. V.—*Duties of physicians in cases of interference.*

§ 1. Medicine is a liberal profession, and those admitted into its ranks should found their expectations of practice upon the extent of their qualifications, not on intrigue or artifice.

§ 2. A physician, in his intercourse with a patient under the care of another practitioner, should observe the strictest caution and reserve. No meddling inquiries should be made—no disingenuous hints given relative to the nature and treatment of his disorder; nor any course of conduct pursued that may directly or indirectly tend to diminish the trust reposed in the physician employed.

§ 3. The same circumspection and reserve should be observed when, from motives of business or friendship, a physician is prompted to visit an individual who is under the direction of another practitioner. Indeed, such visits should be avoided, except under peculiar circumstances; and when they are made, no particular inquiries should be instituted relative to the nature of the disease, or the remedies employed, but the topics of conversation should be as foreign to the case as circumstances will admit.

§ 4. A physician ought not to take charge of or prescribe for a patient who has recently been under the care of another member of the faculty in the same illness, except in cases of sudden emergency, or in consultation with the physician previously in attendance, or when the latter has relinquished the case, or been regularly notified that his services are no longer desired. Under such circumstances, no unjust and illiberal insinuations should be thrown out in relation to the conduct or practice previously pursued, which should

be justified as far as candor and regard for truth and probity will permit; for it often happens that patients become dissatisfied when they do not experience immediate relief, and, as many diseases are naturally protracted, the want of success, in the first stage of treatment, affords no evidence of a lack of professional knowledge and skill.

§ 5. When a physician is called to an urgent case, because the family attendant is not at hand, he ought, unless his assistance in consultation be desired, to resign the care of the patient to the latter immediately on his arrival.

§ 6. It often happens, in cases of sudden illness, or of recent accidents and injuries, owing to the alarm and anxiety of friends, that a number of physicians are simultaneously sent for. Under these circumstances, courtesy should assign the patient to the first who arrives, who should select from those present, any additional assistance that he may deem necessary. In all such cases, however, the practitioner who officiates should request the family physician, if there be one, to be called, and, unless his farther attendance be requested, should resign the case to the latter on his arrival.

§ 7. When a physician is called to the patient of another practitioner, in consequence of the sickness or absence of the latter, he ought, on the return or recovery of the regular attendant, and with the consent of the patient, to surrender the case.

§ 8. A physician, when visiting a sick person in the country, may be desired to see a neighboring patient who is under the regular direction of another physician, in consequence of some sudden change or aggravation of symptoms. The conduct to be pursued on such an occasion is to give advice adapted to present circumstances; to interfere no farther than is absolutely necessary with the general plan of treatment; to assume no future direction, unless it be expressly desired; and, in this last case, to request an immediate consultation with the practitioner previously employed.

§ 9. A wealthy physician should not give advice *gratis* to the affluent; because his doing so is an injury to his professional brethren. The office of a physician can never be supported as an exclusively beneficent one; and it is defrauding, in some degree, the common funds for its support, when fees are dispensed which might justly be claimed.

§ 10. When a physician who has been engaged to attend a case of midwifery is absent, and another is sent for, if delivery is ac-

complished during the attendance of the latter, he is entitled to the fee, but should resign the patient to the practitioner first engaged.

ART. VI.—*Of differences between physicians.*

§ 1. Diversity of opinion and opposition of interest, may, in the medical as in other professions, sometimes occasion controversy and even contention. Whenever such cases unfortunately occur, and cannot be immediately terminated, they should be referred to the arbitration of a sufficient number of physicians, or a *court-medical.*

§ 2. As peculiar reserve must be maintained by physicians towards the public, in regard to professional matters, and as there exist numerous points in medical ethics and etiquette through which the feelings of medical men may be painfully assailed in their intercourse with each other, and which cannot be understood or appreciated by general society, neither the subject-matter of such differences nor the adjudication of the arbitrators should be made public, as publicity in a case of this nature may be personally injurious to the individuals concerned, and can hardly fail to bring discredit on the faculty.

ART. VII.—*Of pecuniary acknowledgments.*

Some general rules should be adopted by the faculty, in every town or district, relative to *pecuniary acknowledgments* from their patients; and it should be deemed a point of honor to adhere to these rules with as much uniformity as varying circumstances will admit.

OF THE DUTIES OF THE PROFESSION TO THE PUBLIC, AND OF THE OBLIGATIONS OF THE PUBLIC TO THE PROFESSION.

ART. I.—*Duties of the profession to the public.*

§ 1. As good citizens, it is the duty of physicians to be ever vigilant for the welfare of the community, and to bear their part in sustaining its institutions and burdens; they should also be ever ready to give counsel to the public in relation to matters especially appertaining to their profession, as on subjects of medical police, public hygiène, and legal medicine. It is their province to enlighten the public in regard to quarantine regulations—the location, arrangement, and dietaries of hospitals, asylums, schools,

prisons, and similar institutions—in relation to the medical police of towns, as drainage, ventilation, &c.—and in regard to measures for the prevention of epidemic and contagious diseases; and when pestilence prevails, it is their duty to face the danger, and to continue their labors for the alleviation of the suffering, even at the jeopardy of their own lives.

§ 2. Medical men should also be always ready, when called on by the legally constituted authorities, to enlighten coroners' inquests, and courts of justice, on subjects strictly medical—such as involve questions relating to sanity, legitimacy, murder by poisons or other violent means, and in regard to the various other subjects embraced in the science of Medical Jurisprudence. But in these cases, and especially where they are required to make a *post-mortem* examination, it is just, in consequence of the time, labor, and skill required, and the responsibility and risk they incur, that the public should award them a proper honorarium.

§ 3. There is no profession, by the members of which eleemosynary services are more liberally dispensed than the medical, but justice requires that some limits should be placed to the performance of such good offices. Poverty, professional brotherhood, and certain of the public duties referred to in the first section of this article, should always be recognized as presenting valid claims for gratuitous services; but neither institutions endowed by the public or by rich individuals, societies for mutual benefit, for the insurance of lives or for analogous purposes, nor any profession or occupation, can be admitted to possess such privilege. Nor can it be justly expected of physicians to furnish certificates of inability to serve on juries, to perform militia duty, or to testify to the state of health of persons wishing to insure their lives, obtain pensions, or the like, without a pecuniary acknowledgment. But to individuals in indigent circumstances, such professional services should always be cheerfully and freely accorded.

§ 4. It is the duty of physicians, who are frequent witnesses of the enormities committed by quackery, and the injury to health and even destruction of life caused by the use of quack medicines, to enlighten the public on these subjects, to expose the injuries sustained by the unwary from the devices and pretensions of artful empirics and impostors. Physicians ought to use all the influence which they may possess, as professors in Colleges of Pharmacy, and by exercising their option in regard to the shops to which their prescriptions shall be sent, to discourage druggists and apothecaries

from vending quack or secret medicines, or from being in any way engaged in their manufacture and sale.

ART. II.—*Obligations of the public to physicians.*

§ 1. The benefits accruing to the public, directly and indirectly, from the active and unwearied beneficence of the profession, are so numerous and important, that physicians are justly entitled to the utmost consideration and respect from the community. The public ought likewise to entertain a just appreciation of medical qualifications; to make a proper discrimination between true science and the assumptions of ignorance and empiricism—to afford every encouragement and facility for the acquisition of medical education—and no longer to allow the statute-books to exhibit the anomaly of exacting knowledge from physicians, under a liability to heavy penalties, and of making them obnoxious to punishment for resorting to the only means of obtaining it.

OFFICERS

AND

PERMANENT MEMBERS.

CATALOGUE

OF THE

OFFICERS AND PERMANENT MEMBERS

OF THE

AMERICAN MEDICAL ASSOCIATION.

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CASPAR WISTER, *Pennsylvania.*

PERMANENT MEMBERS.

Those who have an obelisk [†] prefixed to their names are dead.

MAINE.

Allen, W. H.	*Orono.*
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Dickinson, J. P.	*Bangor.*
Emerson, N.	*Orland.*
Fessenden, C. S. D.	*Portland.*
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Monroe, N. P.	*do.*
Oakes, Sylvester	*Auburn.*
Page, A. F.	*Hancock.*
Page, H. N.	*Penobscot.*
Palmer, G. S.	*Gardner.*
Stockbridge, T. G.	*Bath.*
Swan, Chas. E.	*Calais.*
Weston, J. C.	*Bangor.*

NEW HAMPSHIRE.

Abbott, James B.	*Sanbornton.*
Bancroft, J. P.	*Concord.*
†Bartlett, Josiah	*Stratham.*
Bartlett, Ezra	*Exeter.*
Batchelder, Daniel H.	*Londonderry.*
Batcheller, James	*Marlborough.*
Boyden, F.	*Hinsdale.*
Brown, Thomas	*Manchester.*
Buck, W. D.	*do.*

Carr, Alonzo F.	*Goffstown.*
Carr, John	*Sanbornton.*
Carter, Ezra	*Concord.*
Crosby, Dixi	*Hanover.*
Crosby, Josiah	*Manchester.*
Crosby, T. R.	*Hanover.*
Cummings, Silas	*Fitzwilliam.*
Currie, T. H.	*Boscawen.*
Danforth, James	*New Boston.*
Dickey, Abraham O.	*Lyme.*
Eastman, Josiah C.	*Hamstead.*
Eaton, Harrison	*Merrimack.*
Fernald, John S.	*Barrington.*
Fitch, Francis P.	*Amherst.*
French, John O.	*Chesterfield.*
Gage, Charles P.	*Concord.*
Graves, Josiah G.	*Nashville.*
Hamilton, Cyrus B.	*Lyme.*
Haynes, Timothy	*Concord.*
Hill, Levi G.	*Dover.*
Kelley, S. B.	*Franklin.*
Marshall, Thomas H.	*Mason Village.*
Martin, Noah	*Dover.*
Miller, Luke	*Fitzwilliam.*
Parker, D. T.	*Farmington.*
Pearce, H.	*Winchester.*
Peaslee, Edmund R.	*Hanover.*
Prescott, William	*Concord.*
Sanborn, Nathan	*Henniker.*
Sargent, J. F.	*Concord.*
Smalley, Adoniram	*Lyme, Grafton Co.*
Smith, Albert	*Peterborough.*
Smith, Joseph H.	*Dover.*
Spaulding, Edward	*Nashua.*
Stackpole, P. A.	*Dover.*
Stone, W. P.	*Danbury.*
Thayer, W. H.	*Keene.*
†Twitchell, Amos	*do.*
Twitchell, George B.	*do.*
Webster, E. K.	*Boscawen.*
Woodbury, Peter P.	*Bedford.*

VERMONT.

Allen, C. L.	*Middlebury.*
Babcock, M. N.	*Fairfield.*
Bass, Zacheus	*Middlebury.*
Brown, H. B.	*Hartford.*
Carpenter, W.	*East Randolph.*
Carr, Ezra T.	*Castleton.*
Chandler, Charles B.	*Tunbridge.*
Clark, C.	*Montpelier.*
Converse, Shubael	*Norwich.*
Cushman, Earl	*Orwell.*
Dana, A. G.	*Brandon.*
Drew, O. W.	*Waterbury.*
†Hall, Charles	*Burlington.*
Hatch, Horace	*do.*
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Hinckley, I.	*Thetford.*
Jewett, Calvin	*St. Johnsbury.*
Newell, Selim	*Lyndon.*
Niles, H. H.	*Post Mills.*
Perkins, Joseph	*Castleton.*
Phelps, Edward E.	*Windsor.*
Pitkin, A. S.	*Burlington.*
Pittman, N. J.	*Brattleboro'.*
†Ranney, W. R.	*Townshend.*
Rockwell, W. H.	*Brattleboro'.*
Smith, Orrin	*Montpelier.*
Spalding, James	*do.*
Stiles, J. N.	*Strafford.*
Story, Dyer	*West Windsor.*
Washburn, Cyrus	*Vernon.*
Woodward, A. J.	*Castleton.*
Worcester, E. C.	*Thetford.*

MASSACHUSETTS.

Abbott, Samuel L.	*Boston.*
Adams, Horace W.	*do.*
Adams, Horatio	*Waltham.*
Adams, Nathan	*Springfield.*

†Adams, Z. Boylston	*Boston.*
Agassiz, Louis	*Cambridge.*
Ainsworth, F. S.	*Boston.*
Alden, Ebenezer	*Randolph.*
Allen, Nathan	*Lowell.*
Alley, J. B.	*Boston.*
Bacon, jr., John	*do.*
Bancroft, Amos B.	*Groton.*
Bartlett, George	*Boston.*
Bartlett, Josiah	*Concord.*
Bartlett, Lyman	*New Bedford.*
†Batcheller, Stephen	*Royalston.*
Bates, Joseph N.	*Barre.*
Bell, Luther V.	*Charlestown.*
Bemis, David	*Chickopee.*
Bemis, Jonathan W.	*Charlestown.*
Bethune, George A.	*Boston.*
Bigelow, Henry J.	*do.*
Bigelow, Jacob	*do.*
Blake, E. W.	*do.*
Blake, Jeremiah	*Lowell.*
Blake, J. E.	*Boston.*
Borland, J. Nelson	*do.*
Boutelle, Thomas R.	*Fitchburgh.*
Bowditch, Henry J.	*Boston.*
Bridgeman, William	*Springfield.*
Brown, Buckminster	*Boston.*
Brown, Jonathan	*Tewksbury.*
Buck, Ephraim	*Boston.*
Buckingham, Charles E.	*do.*
Burnap, S. G.	*Holliston.*
Burnham, Z. P.	*Lowell.*
Cabot, jr., Samuel	*Boston.*
Carpenter, E. W.	*Chatham.*
Carpenter, Nelson	*Warren.*
Channing, Walter	*Boston.*
Chapman, T. L.	*Long Meadow.*
Chase, Charles	*Chelsea.*
Childs, H. H.	*Pittsfield.*
Choate, George	*Salem.*

Clark, Edward H.	*Boston.*
Clark, Henry G.	*do.*
Clarke, Moses	*East Cambridge.*
Coale, William E.	*Boston.*
Cogswell, George	*Bradford.*
Collins, Clarkson T.	*Great Barrington, Berkshire Co.*
Comstock, W. W.	*Middleboro'.*
Cornell, W. M.	*Boston.*
Cornish, Aaron	*Falmouth.*
Cotting, B. E.	*Roxbury.*
Cox, jr., Benj.	*Salem.*
Crane, Phineas M.	*East Boston.*
Curtis, Josiah	*Lowell.*
Cutter, Benjamin	*Woburn.*
Cutter, Nehemiah	*Pepperell.*
Dale, William J.	*Boston.*
Davis, R. T.	*Fall River.*
Dearborne, A. D.	*Upper Falls, Newton.*
Dickey, Hanover	*Lowell.*
Dix, John H.	*Boston.*
Eames, Ambrose N.	*Wrentham.*
Eastman, E. T.	*Boston.*
Ellis, Calvin	*do.*
Farnum, jr., J.	*Salem.*
Fay, Allen C.	*Milford.*
Fay, Chas.	*Charlton.*
Fearing, Elisha P.	*Nantucket.*
Fisk, Samuel A.	*Northampton.*
Fisk, Calvin P.	*Fiskdale.*
Flint, Edward	*Leicester, Worcester Co.*
Flint, John	*Boston.*
Folsom Levi	*New Bedford.*
Forsyth, James B.	*Chelsea.*
Garland, G. W.	*Lawrence.*
Gay, George H.	*Boston.*
Gillman, B. F.	*Nantucket.*
Gordon, Charles	*Boston.*
Gordon, Timothy	*Plymouth.*
Gould, Augustus A.	*Boston.*
Graves, John W.	*Lowell.*

Green, John	*Worcester.*
Green, John O.	*Lowell.*
Guiteau, Coridon	*Lee.*
†Hale, Enoch	*Boston.*
Harpur, John	*Sandwich.*
Haskell, Benjamin	*Rockport.*
Hayden, Jno. C.	*Boston.*
Hayward, George	*do.*
Hayward, jr., George	*do.*
Heywood, B. F.	*Worcester, Worcester Co.*
Hitchcock, Alfred	*Fitchburgh, Worcester Co.*
Holmes, Christopher C.	*Milton, Norfolk Co.*
Holmes, Oliver W.	*Boston.*
Homans, John	*do.*
Homans, C. D.	*do.*
Hooker, Anson	*Cambridge.*
Hooker, Anson P.	*do.*
Hooper, Foster	*Fall River.*
Hooper, R. W.	*Boston.*
Hoovey, Daniel	*Greenfield, Franklin Co.*
Hosmer, Hiram	*Watertown.*
†Howe, Zadoc	*Billerica.*
Howe, Appleton	*South Weymouth, Norfolk Co.*
Hoyt, Enos	*Framingham.*
Huntingdon, Elisha	*Lowell.*
Huse, Stephen	*Methuen.*
Inches, H. B.	*Boston.*
Jackson, James	*do.*
Jackson, Charles J.	*do.*
Jackson, J. B. S.	*do.*
Jackson, Woburn	*do.*
Jarvis, Edward	*Dorchester.*
Jeffries, John	*Boston.*
Jennings, Selden	*Richmond.*
Keep, N. C.	*Boston.*
Kimball, Gilman	*Lowell.*
Kittridge, Theodore	*Waltham.*
Lambert, Alfred	*Springfield.*
Lamb, W. D.	*Lawrence.*
Leland, F.	*Milford.*
Leonard, Jonathan	*Sandwich.*

Leonard, M. B.	*East Boston.*
Lewis, Winslow	*Boston.*
Lovell, Ephraim W.	*West Boylston.*
Lyman, George H.	*Boston.*
Mack, William	*Salem.*
Mackie, Andrew	*New Bedford.*
Martin, Oramel	*Worcester.*
Metcalf, John George	*Mendon.*
Miller, E. D.	*Dorchester.*
Minot, Francis	*Boston.*
Monroe, A. LeB.	*Medway.*
Moore, E. B.	*Boston.*
Morland, William W.	*do.*
Morrill, Samuel	*do.*
Morse, James R.	*Cambridge.*
Mowe, Daniel	*Lowell.*
Noyes, Josiah	*Needham P. O.*
Odin, jr., John	*Boston.*
Page, W. H.	*do.*
Palmer, E. D. G.	*do.*
†Parkman, George	*do.*
†Parkman, Samuel	*do.*
Parks, jr., Luther	*do.*
Patch, F. F.	*do.*
Peck, Wm. D.	*Sterling.*
†Pierson, A. L.	*Salem.*
Pierson, E. B.	*do.*
Perkins, Henry C.	*Newburyport.*
Perkins, John P.	*Great Barrington.*
Perry, M. S.	*Boston.*
Pierce, John	*Edgartown.*
†Pilsbury, John D.	*Lowell.*
Pond, Benjamin	*Westborough.*
Poole, Alexander	*Dennis.*
Pratt, Jefferson	*Hopkinton.*
Reynolds, Edward	*Boston.*
Reynolds, Joseph	*Gloucester.*
Richardson, Horace	*Boston.*
Robbins, James W.	*Uxbridge.*
Rook, O. S.	*Pittsfield.*
Root, Martin	*Byfield.*

Russell, Le Baron	*Boston.*
Salisbury, Stephen	*Brookline.*
Sargent, J.	*Worcester.*
Sargent, H.	*do.*
Savory, Charles A.	*Lowell.*
Shattuck, jr., George C.	*Boston.*
Shurtleff, Augustine	*Brookline.*
Shurtleff, Nathaniel B.	*Boston.*
†Smith, James M.	*Springfield.*
Smith, J. V. C.	*Boston.*
Snow, A. B.	*do.*
Spaulding, Miles	*Dunstable.*
Spooner, John P.	*Dorchester.*
Spooner, Paul	*New Bedford.*
Sprague, Seth L.	*Boston.*
Stedman, Charles H.	*do.*
Stimson, Jeremy	*Dedham.*
Stevens, William F.	*Stoneham.*
Stone, James W.	*Boston.*
Stone, Joseph	*Hardwick.*
Stone, Henry O.	*Boston.*
Storer, D. Humphreys	*do.*
Storer, H. R.	*do.*
Taylor, A. H.	*Shelburne Falls.*
Taylor, jr., Nathaniel W.	*Springfield.*
Thayer, W. Henry	*Boston.*
Thomas, A.	*Cambridge.*
Thomas, A. T.	*Boston.*
Thompson, James	*Northampton.*
Townsend, S. D.	*Boston.*
Wales, Bradford L.	*Randolph.*
Ware, Charles E.	*Boston.*
Ware, John	*do.*
Ware, Jonathan	*Milton.*
†Warren, John C.	*Boston.*
Warren, J. Mason	*do.*
Warren, jr., J. W.	*do.*
†Wellington, T.	*West Cambridge.*
Wheeler, W. G.	*Chelsea.*
White, Vassel	*Curtisville P. O., Stockbridge, Berkshire Co.*

Whitney, Simon	*Framingham.*
Whitridge, W. C.	*New Bedford.*
†Wilder, Charles W.	*Leominster.*
Wiley, Adams	*Roxbury.*
Willard, H.	*Boston.*
†Williams, Stephen W.	*Deerfield.*
Woorland, William W.	*Boston.*
Workman, William	*Worcester, Worcester Co.*
York, Jasper H.	*Boston.*

RHODE ISLAND.

Allen, Hiram	*Woonsocket.*
Arnold, S. Augustus	*Providence.*
Ballou, A. W.	*do.*
Baker, Geo. P.	*do.*
Brown, W. O.	*do.*
Brownell, Richmond	*do.*
Capron, George	*do.*
Clapp, Sylvanus	*Pawtucket.*
Cleveland, H.	*New Providence.*
†Clifford, Lewis W.	*Providence.*
Collins, George L.	*do.*
Dunn, Theophilus C.	*Newport.*
Eldridge, J. H.	*East Greenwich.*
Ely, James W. C.	*Providence.*
Fowler, Ezekiel	*Woonsocket Falls.*
King, David	*Newport.*
Le Prohon, E. P.	*Providence.*
Mauran, Joseph	*do.*
Miller, Lewis L.	*do.*
Parsons, Charles W.	*do.*
Parsons, Usher	*do.*
Pratt, H. P.	*do.*
Rivers, H. W.	*do.*
Snow, Ed. M.	*do.*
Warren, J. E.	*Cumberland.*

CONNECTICUT.

Barrows, Ashbel W.	*Hartford.*
†Beach, Samuel	*Bridgeport.*

Beardsley, Lucian N.	*Milford.*
Beardsley, Sheldon	*New Haven.*
Beckwith, Josiah G.	*Litchfield.*
Bennett, Hanford N.	*Bridgeport.*
Beresford, S. B.	*Hartford.*
Bishop, E. H.	*New Haven.*
†Bowen, Samuel	*Thompson.*
Bradford, Milton	*West Woodstock.*
Brigham, Norman	*North Mansfield.*
Bronson, Henry	*New Haven.*
Brownell, Clarence M.	*East Hartford.*
Budington, George E.	*New Haven.*
Burke, George W.	*Middletown.*
Burr, David S.	*Westport.*
Campbell, Harvey	*Voluntown.*
Canfield, Joel	*Guilford.*
†Carrington, Edwin W.	*Farmington.*
Casey, William B.	*Middletown.*
Castle, Andrew	*Woodbridge.*
Catlin, Benjamin H.	*West Meriden.*
Catlin, Samuel	*Watertown.*
Comings, B. N.	*New Britain.*
Deming, Ralph	*Sharon.*
Dickinson, Francis L.	*Willington.*
Downes, John K.	*New Haven.*
Downing, Eleazer B.	*Preston.*
Ford, John D.	*Norwich.*
Fowler, Remus M.	*Washington.*
Francis, D. P.	*New London.*
Haile, Ashbel B.	*Norwich.*
Hall, Eli	*East Hartford.*
Hammond, Justin	*Daysville.*
†Harrison, David	*Middletown.*
†Hatch, Johnson C.	*Kent.*
Hawley, Roswell	*West Meriden.*
Hooker, Charles	*New Haven.*
Hooker, Worthington	*do.*
Hubbard, Denison H.	*Clinton.*
Hubbard, Robert	*Bridgeport.*
Hubbard, Stephen G.	*New Haven.*

Hutchins, Samuel	*West Killingly.*
Hutchinson, Ira	*Cromwell.*
Huxley, A. M.	*Goshen.*
Ives, Eli	*New Haven.*
Ives, Nathan B.	*do.*
Jarvis, George O.	*Portland.*
Jewett, Pliny A.	*New Haven.*
Knight, Jonathan	*do.*
Lindsley, Charles A.	*do.*
†Lyman, Norman	*Warren.*
Matthews, H. W. E.	*New Haven.*
Middlebrook, Elijah	*Trumbull.*
Nicoll, John	*New Haven.*
North, B. B.	*Cornwall.*
Noyes, Samuel S.	*New Canaan.*
Nye, Elisha B.	*Middletown.*
Peters, Manly	*Woodville.*
Pierson, William S.	*Windsor.*
†Pike, Nathan S.	*Sterling Hill.*
Platt, Gideon L.	*Waterbury.*
Rockwell, P. G.	*do.*
Rogers, Benjamin	*Hartford.*
Russell, Gurdon W.	*do.*
Salisbury, Samuel T.	*Plymouth.*
Sanford, Leonard J.	*New Haven.*
Silliman, jr., Benjamin	*do.*
Skinner, Alden	*Rockville.*
St. John, Gamaliel H.	*Merwinsville.*
†Sumner, George	*Hartford.*
Talcott, Alvan	*Guilford.*
Totten, Thomas H.	*New Haven.*
†Warner, Richard	*Cromwell.*
†Webb, Reynold	*Madison.*
†Welch, Archibald	*Hartford.*
Welch, Benjamin	*Lakeville.*
Welch, James	*Winstead.*
Welch, William W.	*Norfolk.*
White, Roderick A.	*Simsbury.*
Williams, Lewis	*Pomfret.*
†Wilson, Myron W.	*Hartford.*
†Witter, William	*Willimantic.*

Wood, William	*East Windsor Hill.*
Woodruff, William	*Plymouth.*
Woodward, Ashbel	*Franklin.*
Wright, Albert A.	*Canaan.*

NEW YORK.

Adams, John G.	*New York.*
Allen, R. L.	*Saratoga Springs.*
Allen, Lucius H.	*Owego, Tioga Co.*
Anderson, James	*New York.*
Anderson, W. E.	*Stapleton.*
Armsby, James H.	*Albany.*
Armstrong, E. W.	*Rochester.*
Atwater, D. F.	*Brooklyn.*
Austin, James M.	*Waterford.*
Ayres, Daniel	*Brooklyn.*
Ayres, Daniel	*Amsterdam.*
Babcock, Charles	*New Hartford, Oneida Co.*
Babcock, M. N.	*Saratoga Springs.*
Bacon, C. G.	*Fulton.*
Baker, jr., A.	*Norwich.*
Barker, B. Fordyce	*New York.*
Barrett, S.	*Le Roy.*
Batchelder, J. P.	*New York.*
Bauer, Louis	*Brooklyn.*
Bay, William	*Albany.*
Baxter, Hiram	*Stillwater, Saratoga Co.*
Beadle, E. L.	*New York.*
Beck, T. Romeyn	*Albany.*
Beebe, Seneca	*McDonough, Chenango Co.*
Bissell, D. P.	*Utica.*
Blakeman, William N.	*New York.*
Blatchford, Thomas W.	*Troy.*
Bolton, Jackson	*New York.*
Borrowe, J. H.	*do.*
Bradford, George W.	*Homer, Cortland Co.*
Brady, John A.	*Brooklyn.*
Briggs, W. H.	*Rochester.*
Brinsmade, Thomas C.	*Troy.*
Brooks, P. B.	*Binghampton, Broome Co.*

Brown, H. W.	*New York.*
Buck, Gurdon	*do.*
Budd, A. E.	*Medford, Burlington Co.*
Budlong, Caleb	*Frankford, Herkimer Co.*
Buel, William P.	*New York.*
Bulkley, Henry D.	*do.*
Burton, C. V. W.	*Lansingburgh.*
Burwell, Bryant	*Buffalo.*
Burwell, George N.	*do.*
Calkins, Alonzo	*New York.*
Cammann, G. P.	*do.*
Carr, Edson	*Canandaigua, Ontario Co.*
Cary, Walter	*Buffalo.*
Carter, Galen	*New York.*
Cash, M. H.	*Ridgebury, Orange Co.*
Chamberlayne, J. K.	*Cazenovia.*
Chubbuck, H. S.	*Elmira, Chenango Co.*
Church, W. Henry	*New York.*
Clark, Alonzo	*do.*
Clements, James W. G.	*do.*
Clymer, Meredith	*do.*
Coates, L. B.	*Batavia.*
Cobb, J. V.	*Rome.*
Cock, Thomas	*New York.*
Cock, Thomas F.	*do.*
Cockcroft, James	*do.*
Coe, A. B.	*Oswego.*
Conant, D. S.	*New York.*
Congar, Horace M.	*Buffalo.*
Cook, Simeon A.	*Buskirk's Bridge.*
Corliss, Hiram	*Greenwich, Washington Co.*
Corson, J. W.	*New York.*
Corson, J.	*do.*
Cotes, L. B.	*Batavia.*
Coventry, C. B.	*Utica.*
Crandell, R. O.	*Owego.*
Dalton, J. C.	*New York.*
Daniels, E.	*Union, Broome Co.*
Davis, E. H.	*New York.*
Dean, H. W.	*Rochester.*
Deming, J. P. H.	*Palmyra.*

Dering, Nicoll H.	*Utica.*
Donoughue, E. O.	*Bergen, Genesee Co.*
Doolittle, A. F.	*Herkimer.*
Douglas, J. Hancock	*New York.*
Downs, Henry S.	*do.*
Draper, John W.	*do.*
Dubois, Abram	*do.*
Dwight, W. C.	*Moscow, Livingston Co.*
Earle, Pliny	*New York.*
Eastman, M. H.	*Owego.*
Eliott, jr., Geo. T.	*New York.*
Ely, W. W.	*Rochester.*
Emmet, Thomas Addis	*New York.*
Enos, D. C.	*Brooklyn.*
Finnell, T. C.	*New York.*
Flint, Austin	*do.*
Ford, Corydon L.	*Lockport.*
Foster, Joel	*New York.*
Foster, S. Conant	*do.*
Francis, John W.	*do.*
French, S. H.	*Lisle, Broome Co.*
Gardner, Augustus K.	*New York.*
Garrish, J. P.	*do.*
Gilman, Chandler R.	*do.*
Glück, Isidore	*do.*
Goodsell, Thomas	*Utica.*
Gray, Henry G.	*North White Creek.*
Green, David	*New York.*
Green, J. W.	*do.*
Greene, Caleb	*Homer, Cortland Co.*
†Greene, Isaac	*New York.*
Green, Horace	*do.*
Goodyear, Miles	*Cortland.*
Griscom, John H.	*New York.*
Guthrie, C. B.	*do.*
Hadley, George	*Buffalo.*
Halsted, T. M.	*New York.*
Hamilton, Frank H.	*Buffalo.*
Harvey, Charles W.	*do.*
Hard, P. H.	*Oswego.*
Hart, John	*New York.*

Hart, Samuel	*Brooklyn.*
Hawley, Joel E.	*Ithaca.*
Henschell, C.	*New York.*
Hubbard, Samuel T.	*do.*
Hubbard, Silas	*Buffalo.*
Hun, Thomas	*Albany.*
Hunt, Sanford B.	*Buffalo.*
Husted, N. C.	*New York.*
Hutchison, J. C.	*Brooklyn.*
Hyde, Frederick	*Cortlandville.*
Hyde, Lucius	*Brooklyn.*
Ingraham, T. M.	*Flatbush.*
Jackson, Thomas	*Binghampton.*
Jackson, William H.	*New York.*
Jacobs, Ferris	*Delhi, Delaware Co.*
Jenkins, J. Foster	*Yonkers.*
Jerome, James H.	*Trumansburg.*
Jewett, C.	*Buffalo.*
Jewett, Harvey	*Canandaigua.*
Jones, Daniel S.	*Baldwinsville.*
Keene, Stephen S.	*New York.*
Kissam, K. S.	*do.*
Krackowitzer, E.	*Brooklyn.*
Lee, Charles A.	*New York.*
Linsly, Jared	*do.*
Little, G. S.	*Kirkwood.*
MacFarlan, Ebenezer	*Williamsburg, Long Island.*
†Manly, James R.	*New York.*
March, Alden	*Albany.*
Markoe, T. M.	*New York.*
McCall, John	*Utica.*
McIntyre, A.	*Wayne Co.*
McIntyre, A.	*Palmyra.*
McKay, Lawrence	*Rochester.*
McNaughton, James	*Albany.*
†McNevin, William H.	*New York.*
McNulty, John	*do.*
McPhail, L. C.	*Brooklyn.*
Metcalfe, John T.	*New York.*
Miller, John	*do.*
Miner, William	*do.*

Miner, J. M.	*Brooklyn.*
†Mitchell, Henry	*Norwich.*
Mixer, S. F.	*Buffalo.*
Monell, J. A.	*New York.*
Morris, Philip V. N.	*Buskirk's Bridge.*
Morris, R. L.	*New York.*
Mott, Valentine	*do.*
Mott, Walter	*Schuylerville, Saratoga Co.*
Moulton, Peter	*New Rochelle, Westchester Co.*
Newman, Jas. M.	*Buffalo.*
Ogden, Benjamin	*New York.*
Orton, J. G.	*Binghampton.*
Parker, Willard	*New York.*
Parker, Edward H.	*do.*
Parkhurst, W. H. H.	*Frankfort.*
Parmly, Eleazer	*New York.*
†Pattison, Granville S.	*do.*
Peters, George A.	*do.*
Phelps, James L.	*do.*
Phillips, S. B.	*do.*
Pierce, J. B.	*Lyons.*
Pomeroy, Charles G.	*Newark, Wayne Co.*
Pond, James O.	*New York.*
Pope, H. H.	*Rome.*
Post, Alfred C.	*New York.*
Potter, U.	*Minden, Montgomery Co.*
Punnett, John	*New York.*
Purdy, J.	*Elmira, Chemung Co.*
Purdy, Samuel A.	*New York.*
Purple, S. S.	*do.*
Raymond, Charles H.	*do.*
Reese, D. Meredith	*do.*
Reid, Jno.	*Rochester.*
Reynolds, Tabor B.	*Wilton, Saratoga Co.*
Reynolds, J. H.	*do.*
Rockwell, Wm.	*New York.*
†Rodgers, J. Kearny	*do.*
Russ, J. D.	*do.*
Saunders, A. L.	*Brookfield, Madison Co.*
Sayre, Lewis A.	*New York.*
Schilling, E.	*do.*

Shanks, John	*New York.*
Shelton, John D.	*Jamaica.*
Shipman, Azariah B.	*Syracuse.*
Skilton, Avery J.	*Troy.*
Smith, Albert	*New Rochelle.*
Smith, Charles D.	*New York.*
Smith, Joseph M.	*do.*
Smith, Stephen	*New York.*
Snow, Simeon	*Root, Montgomery Co.*
Snyder, Morgan	*Fort Plain.*
Sprague, J. S.	*Exeter, Otsego Co.*
†Stearns, John	*New York.*
Stephenson, Mark	*do.*
Stevens, Alexander H.	*do.*
Stewart, F. Campbell	*do.*
Stewart, James	*do.*
Stewart, Philanda	*Peekskill.*
St. John, Samuel	*New York.*
Stout, Arthur B.	*do.*
Swaine, Chas. H.	*Cortlandville.*
†Swett, John A.	*New York.*
Taft, Marcus L.	*do.*
Taylor, Isaac E.	*do.*
Taylor, Wm.	*Manlius.*
Tefft, Lake J.	*Onondaga.*
Tellkampf, Theo. A.	*New York.*
Thomas, Daniel	*Utica.*
Thompson, jr., A. G.	*New York.*
Thompson, A. H.	*Walden.*
Thompson, Alexander	*Aurora, Cayuga Co.*
Thorn, James	*Troy.*
Trask, J. D.	*White Plains.*
Trenor, Jno.	*New York.*
Turner, Thomas	*Flatbush.*
Van Buren, W. H.	*New York.*
Van Buren, Peter	*do.*
Vanderpool, S. O.	*Albany.*
Van Kleek, John R.	*New York.*
Van Pelt, M. D.	*do.*
Van Rensselaer, Alexander	*do.*
Wade, T. A.	*Brooklyn.*

Warner, E. B.	*New York.*
Warren, James	*do.*
Watson, John	*do.*
Watts, Robert	*do.*
Weber, G.	*do.*
Weeks, Cyrus	*do.*
West, H. S.	*Binghampton, Broome Co.*
Wheeler, Lewis C.	*Troy.*
White, Devillo	*Sherburne, Chenango Co.*
White, James P.	*Buffalo.*
White, Oliver	*New York.*
White, S. P.	*do.*
Willard, Augustus	*Green, Chenango Co.*
Wilcox, Charles H.	*Buffalo.*
Winton, Nelson	*Havana, Chemung Co.*
†Wing, Joel A.	*Albany.*
Wood, Isaac	*New York.*
Wood, James R.	*do.*
Woodward, G. F.	*do.*
Wooster, Joseph	*do.*
Wotkyns, Alfred	*Troy.*

NEW JERSEY.

Bateman, B. Rush	*Cedarville.*
Blane, J.	*Perryville.*
Brakeley, P. F.	*Belvidere, Warren Co.*
Butcher, Charles	*Maurice Town, Cumberland Co.*
Butler, S. W.	*Burlington.*
Canfield, J. W.	*Morristown.*
Chetwood, G. R.	*Elizabethtown.*
Clark, C. F.	*Woodbury.*
Clarke, J. Henry	*Newark.*
†Cole, N. W.	*Burlington.*
Coleman, J. B.	*Trenton.*
Coleman, J. P.	*Pemberton.*
Condict, Lewis	*Morristown.*
Cook, Chas.	*Jersey City.*
Cooper, Richard M.	*Camden.*
Corson, T. J.	*Trenton.*
Craig, J. W.	*Plainfield.*

Cullen, Thomas F.	*Camden.*
Dougherty, Alexander N.	*Newark.*
Elmer, William	*Bridgeton.*
Fithian, Enoch	*Greenwich.*
Fithian, Joseph	*Woodbury.*
Garrison, Charles	*Swedesboro'.*
Garrison, J. F.	*do.*
Gibbon, Quinton	*Salem.*
Godell, Geo.	*Burlington City.*
Haines, Job	*Burlington.*
Hampton, Isaac H.	*Bridgeton.*
Hendry, Charles D.	*Camden Co.*
Hunt, T. Edgar	*Clarksville.*
Longstreet, H. H.	*Bordentown.*
Marsh, Elias J.	*Paterson.*
Martin, S. K.	*Martinville.*
Morford, A. D.	*Newton.*
Mulford, Isaac L.	*Camden.*
Munn, J. B.	*Chatham, Morris Co.*
Nichols, Whitfield	*Newark.*
Parrish, Joseph	*Burlington.*
Phillips, John H.	*Pennington.*
Pennington, Samuel H.	*Newark.*
Pierson, W.	*Orange.*
Porter, E. M.	*Bridgeton.*
Rogers, Alexander N.	*Paterson.*
Read, Zachariah	*Mount Holly.*
Schenck, F. S.	*Camden.*
Sickler, J. R.	*Carpenter's Land.*
Smith, Lyndon A.	*Newark.*
Steuart, J. R.	*Newton.*
Stratton, B. H.	*Mount Holly.*
Taylor, Othniel H.	*Camden.*
Thompson, Jno.	*Hoboken.*
Woodruff, A. D.	*Haddonfield.*

PENNSYLVANIA.

Allen, J. M.	*Philadelphia.*
Andrews, James P.	*Lancaster.*
Ashmead, William	*Philadelphia.*

Atlee, Washington L.	*Philadelphia.*
Atlee, John L.	*Lancaster.*
Bache, Franklin	*Philadelphia.*
Bache, T. H.	*do.*
Baker, Charles L.	*Lancaster.*
Bare, A. S.	*do.*
Barrington, Samuel	*Philadelphia.*
†Baskin, George W.	*Mercer.*
Bell, John	*Philadelphia.*
Bertolet, P. G.	*Oley.*
Betton, Thomas F.	*Germantown.*
†Bibighaus, C. H.	*Philadelphia.*
Biddle, John B.	*do.*
Bird, J. F.	*do.*
Bond, Henry	*do.*
Breitenbach, J.	*Myerstown.*
Bridges, Robert	*Philadelphia.*
Brinton, John B.	*Westchester.*
Brown, H. J.	*Philadelphia.*
Bruce, S. D.	*Pittsburg.*
Bryan, Joseph R.	*Philadelphia.*
Bryan, James	*do.*
Burden, Jesse R.	*do.*
†Burrowes, Francis S.	*Lancaster.*
Carpenter, Henry	*do.*
Carpenter, James S.	*Pottsville.*
Carson, Joseph	*Philadelphia.*
Carson, William	*do.*
Cassidy, P.	*Lancaster.*
†Chapman, Nathaniel	*Philadelphia.*
Coates, B. Hornor	*do.*
Condie, D. Francis	*do.*
Confer, J. M.	*Fasteria.*
Conrey, Jno.	*Manayunk.*
Corse, J. S.	*Philadelphia.*
Corson, Hiram,	*Plymouth Meeting, Mont. Co.*
Corson, W.	*Norristown.*
Curtis, L.	*Philadelphia.*
Da Costa, J.	*do.*
Darlington, William	*Westchester.*
Dillard, T.	*Philadelphia.*

Dilworth, Samuel	*Pittsburg.*
Dorsey, J. H.	*Huntington.*
Drayton, H. E.	*Philadelphia.*
†Duffield, Samuel	*Lancaster.*
Duncan Robt.	*do.*
Dunglison, Robley	*Philadelphia.*
Dyer, Jno.	*Danborough.*
Ehler, J. Augustus	*Lancaster.*
Ellmaker, Thomas	*do.*
Ely, Edward	*New Hope, Bucks Co.*
Emanuel, M.	*Marcus Hook.*
Emerson, Gouverneur	*Philadelphia.*
Emlen, J. V.	*do.*
Eshleman, J. K.	*Lancaster Co.*
Finley, W. R.	*Frankstown.*
Foulke, J. L.	*Gwynedd, Montgomery Co.*
Fox, George	*Philadelphia.*
Fronefield, Charles	*Montgomery Co.*
Gaston, A. K.	*Chester Co.*
Gazzam, Joseph P.	*Pittsburg.*
Gemmill, J. N.	*Alexandria.*
Gerhard, William W.	*Philadelphia.*
Gibson, William	*do.*
Gilbert, David	*do.*
Given, R. A.	*do.*
Goddard, P. B.	*do.*
†Grant, William R.	*do.*
Green, Jas. M.	*do.*
Green, Traill	*Easton.*
Gries, Wm.	*Reading.*
Gross, S. D.	*Philadelphia.*
Gryder, M. R.	*Chestnut Level, Lancaster Co.*
Guilford, W. M.	*Lebanon.*
Haines, William S.	*Philadelphia.*
Halberstadt, Geo.	*Pottsville.*
Hallowell, Edward	*Philadelphia.*
Handy, J. H.	*do.*
Harry, Samuel H.	*Doe Run, Chester Co.*
Hart, Alexander C.	*Philadelphia.*
Hartshorne, Henry	*do.*
Hartshorne, Edward	*do.*
atfield, N. L.	*do.*

Hays, Isaac	*Philadelphia.*
Heger, Anthony	*Pottsville.*
Herbst, Wm.	*Reading.*
Hewson, Addinell	*Philadelphia.*
Hiester, Frank M.	*Reading.*
Hiester, J. P.	*Reading.*
Hinkle, Franklin	*Lancaster.*
Hodge, Hugh L.	*Philadelphia.*
Hollingsworth, S. L.	*do.*
Horner, G. R. B.	*do.*
†Horner, William E.	*do.*
†Humes, Samuel	*Lancaster.*
Huston, Robert M.	*Philadelphia.*
Innes, Charles.	*Easton.*
Irwin, John S.	*Pittsburg.*
Jackson, R. M. J.	*Cresson.*
Jackson, Samuel (Prof.)	*Philadelphia.*
Jackson, Samuel	*do.*
James, R. E.	*Stonechurch.*
James, Charles	*Easton.*
James, O. P.	*Doylestown.*
Janney, Benjamin S.	*Philadelphia.*
Jewell, Wilson	*do.*
Keating, Wm. V.	*do.*
Keith, William	*do.*
Keneagy, Samuel	*Strasburg, Lancaster Co.*
Kennedy, A. L.	*Philadelphia.*
Kerr, James W.	*York, York Co.*
†Kerfoot, George B.	*Lancaster.*
King, Charles R.	*Philadelphia.*
†Klapp, William H.	*do.*
Koehler, J. G.	*Schuylkill Haven.*
Lajus, D. Paul	*Philadelphia.*
†Lang, Edmund	*do.*
Lamb, Jno. F.	*Frankford.*
La Roche, R.	*Philadelphia.*
†Leib, Henry F.	*do.*
Leidy, Jos.	*do.*
Lewis, Samuel	*do.*
Littell, S.	*do.*
Lowman, Jno.	*Johnstown, Cambria Co.*

Luden, J. B.	*Huntingdon.*
Ludlow, J. L.	*Philadelphia.*
Mahon, O. S.	*Columbia.*
Martin, Chas. H.	*Allentown.*
Martin, J. A.	*Whitemarsh.*
†Mathews, Charles H.	*Doylestown.*
Mayburry, William	*Philadelphia.*
McClellan, J. H. B.	*do.*
McCorkle, W. S.	*Columbia.*
McCoy, John M.	*Bellefonte.*
McCulloch, John	*Huntingdon.*
McIlvain, William	*York.*
Meigs, Charles D.	*Philadelphia.*
Mitchell, John K.	*do.*
Mitchell, Thomas D.	*do.*
Moore, John Wilson	*do.*
Morris, Casper	*do.*
†Morton, Samuel George	*do.*
Morton, C. J.	*Springfield.*
Mosser, D. O.	*Breinyville.*
Mowry, Robert B.	*Alleghany City.*
Muhlenburg, F. H.	*Lancaster.*
Muhlenburg, Henry E.	*do.*
Murphey, Andrews	*Parkesburg, Chester Co.*
Mütter, Thomas D.	*Philadelphia.*
Naudain, Arnold	*do.*
Neill, John	*do.*
Norris, George W.	*do.*
Ogier, S. A.	*Frazier, Chester Co.*
Orlady, H.	*Petersburg, Huntingdon Co.*
Page, William Byrd	*Philadelphia.*
Pancoast, Joseph	*do.*
Parker, Samuel	*Hempfield, Lancaster Co.*
†Parrish, Isaac	*Philadelphia.*
Parry, Ely	*Lancaster.*
†Patterson, Henry S.	*Philadelphia.*
†Patterson, George W.	*do.*
Paul, J. Rodman	*do.*
Pennypacker, I. A.	*do.*
Pepper, William	*Philadelphia.*
Piper, W. A.	*do.*

Pollock, A. M.	*Pittsburg.*
Powell, F. W.	*Philadelphia.*
†Randolph, Jacob	*do.*
Raub, J. K.	*Quarryville.*
Ream, John	*Lancaster.*
Reese, J. J.	*Philadelphia.*
Remington, Isaac	*do.*
Richards, C. O.	*Lancaster.*
Richardson, T.	*Brooklyn.*
Richardson, T. G.	*Philadelphia.*
Rieser, Franklin	*Reading.*
Rivinus, Edward F.	*Westchester.*
Rodman, Lewis	*Philadelphia.*
†Rogers, James B.	*do.*
Rogers, R. E.	*do.*
Ross, J. D.	*Williamsburg.*
Rothrock, Abm.	*Mc Veytown.*
Ruschenberger, W. S. W.	*Philadelphia.*
Sargent, jr., Winthrop	*West Philadelphia.*
Sheller, Adam	*Mt. Joy, Lancaster Co.*
Schneck, B. F.	*Lebanon, do.*
Shoemaker, Charles	*Jenkintown.*
Smaltz, J. H.	*Philadelphia.*
Smith, jr., Francis G.	*do.*
Smith, H. H.	*do.*
Smith, H. Y.	*do.*
Smith, R. K.	*do.*
Smith, Moses B.	*do.*
†Spencer, Thomas D.	*do.*
Stanton, David	*New Brighton, Beaver Co.*
Stewart, J. D.	*Philadelphia.*
Stillé, Alfred	*do.*
†Stillé, Moreton	*do.*
Stocker, A. E.	*do.*
Stubbs, J. B.	*Rock P. O., Lancaster Co.*
Swift, Edward	*Easton.*
Thomas, George W.	*Norristown.*
Thomas, Isaac	*Westchester.*
Thomas, R. P.	*Philadelphia.*
Thomason, W. D.	*Harrisburg.*
Thompson, William S.	*Lancaster.*

Todd, J. E.	*Philadelphia.*
Townsend, R. H.	*do.*
Townsend, W. W.	*Chatham.*
Turnbull, Laurence	*Philadelphia.*
Uhler, John	*do.*
Vanbuskirk, Wm. A.	*Pottstown, Montgomery Co.*
Wadsworth, Henry	*Philadelphia.*
Walker, Isaac R.	*Spread Eagle, Chester Co.*
Wallace, Edward	*Reading.*
Watson, William H.	*Bedford.*
West, Francis	*Philadelphia.*
Weidler, Isaac C.	*Seacock P. O., Lancaster Co.*
Wilcocks, Alexander	*Philadelphia.*
Wilson, William J.	*Potter's Mill, Centre Co.*
Wilson, Elwood	*Philadelphia.*
Wiltbank, John	*do.*
Wimley, G. W.	*Limerick Township, Mont. Co.*
Wister, Caspar	*Philadelphia.*
Wood, George B.	*do.*
Wood, Thomas	*Muncy, Lycoming Co.*
Worthington, Wilmer	*Westchester.*
Yardley, Thomas H.	*Philadelphia.*
Zeigler, J. L.	*Mount Joy P. O., Lancaster Co.*
Zeigler, George J.	*Philadelphia.*
Zulick, S. M.	*Orwigsburg.*

DELAWARE.

Askew, Henry F.	*Wilmington.*
Baker, George R.	*do.*
Bullock, W. R.	*do.*
Bush, Lewis P.	*do.*
Clark, R. H.	*Milford.*
Couper, James	*New Castle.*
Cummins, William	*Smyrna.*
Grimshaw, A. H.	*Wilmington.*
Hamilton, William N.	*Cantwell's Bridge.*
Jones, W.	*Vernon.*
Jump, Isaac	*Dover.*
Merritt, John	*Middletown.*
Mitchell, J. R.	*Milford.*

Morris, William W.	*Dover.*
Perkins, John D.	*Smyrna.*
Porter, Robert R.	*Wilmington.*
Saulsbury, G.	*Dover.*
†Smith, Thomas Mackie	*Brandywine.*
Thomson, James W.	*Wilmington.*
Wales, J. P.	*Brandywine.*
Wilson, James F.	*Wilmington.*

MARYLAND.

Alexander, Ashton	*Baltimore.*
Armitage, James	*do.*
Atkinson, Thomas C.	*do.*
Backler, Thomas H.	*do.*
Baer, M. S.	*do.*
Baker, Alfred	*do.*
Baldwin, E. C.	*do.*
Baltzell, W. H.	*do.*
Baxley, Willis H.	*do.*
Belt, W. F.	*Prince George.*
Bolton, James	*Baltimore.*
Bond, Thomas E.	*do.*
Bordley, James	*do.*
Boyd, Charles	*Frederick City.*
Briscoe, John H.	*Baltimore.*
Chamberlaine, J. E. M.	*Easton.*
Chew, Samuel	*Baltimore.*
Clarke, S. R.	*do.*
Cohen, Joshua J.	*do.*
Cox, C. C.	*Easton.*
Crane, W. B.	*Baltimore.*
Dallam, William M.	*Hartford Co.*
Davis, William H.	*Baltimore.*
Dawson, James	*St. Michael's, Talbot Co.*
Donaldson, Francis	*Baltimore.*
Dorsey, Lloyd	*Frederick.*
Dulin, Alexander F.	*Baltimore.*
Dunbar, John R. W.	*do.*
Duvall, E. P.	*do.*
Duvall, W.	*Washington, Montgomery Co.*

Fonerden, John	*Baltimore.*
Frick, Charles	*do.*
Gibson, George S.	*do.*
Gibson, J. Grigg	*Fredericktown.*
Gilman, J.	*Baltimore.*
Goldsborough, H. T.	*Easton, Talbot Co.*
Gunn, John P.	*Baltimore.*
Handy, Samuel K.	*Princess Ann.*
Hardcastle, E. M.	*Trappe.*
Harris, Chapin A.	*Baltimore.*
Hemsley, W.	*Caroline Co.*
Hintze, F. E. B.	*Baltimore.*
Hopkins, Joel	*Elkridge Landing, Howard Co.*
Jameson, sen., Horatio G.	*Baltimore.*
†Jenkins, Solomon M.	*Easton.*
Johnstone, C.	*Baltimore.*
Kennard, T. C.	*Harmony.*
Kinnemann, P. S.	*Baltimore.*
Kinney, jr., William	*do.*
Laurence, G. W.	*Catonsville.*
Leonard, William T.	*Baltimore.*
Macgill, C.	*Hagerstown.*
Martin, Thomas W.	*Dorchester Co.*
Matthews, Thomas	*Milestown.*
Miltenberger, G. W.	*Baltimore.*
Monkur, John C. S.	*do.*
Monmonier, J. T.	*do.*
Murray, R. (U. S. A.)	*do.*
O'Donnel, D. A.	*do.*
Piggot, A. S.	*Baltimore.*
Pinckney, Ninian (U. S. N.)	*Annapolis.*
Power, William	*Baltimore.*
Riley, William	*do.*
Roberts, George C. M.	*do.*
Robinson, Alexander C.	*do.*
Roby, Joseph	*do.*
Sappington, J. K.	*Havre-de-Grace.*
Sappington, Thomas	*Liberty, Frederick Co.*
Smith, Nathan R.	*Baltimore.*
Smith, Samuel P.	*Cumberland.*
Steiner, L. H.	*Baltimore.*

Steuart, R. S.	*Baltimore.*
Stevenson, J. S.	*do.*
Stokes, William H.	*do.*
Teackle, John N.	*do.*
Theobald, Elisha W.	*do.*
Thomas, Richard H.	*do.*
Tyler, Samuel	*Frederick City.*
Warfield, Jesse L.	*Westminster, Carroll Co.*
Webster, John Lee	*Baltimore.*
White, A. M.	*Easton.*
Williams, W.	*Somerset Co.*
Wroth, Peregrine	*Chestertown.*
Wynne, James	*Baltimore.*
Yeates, John L.	*do.*

DISTRICT OF COLUMBIA.

Boyle, Cornelius	*Washington.*
Busey, S. C.	*do.*
Coolidge, R. H.	*do.*
Dove, G. M.	*do.*
Duhamel, W. J. C.	*do.*
Garnett, A. Y. P.	*do.*
Hall, J. C.	*do.*
Hellen, B. J.	*do.*
Johnston, William P.	*do.*
Lindsley, Harvey	*do.*
May, J. F.	*do.*
Miller, Thomas	*do.*
Morgan, James E.	*do.*
Riley, J. C.	*do.*
Riley, Joshua	*Georgetown.*
Semmes, A. J.	*Washington.*
Stone, Robert K.	*do.*
Thomas, John M.	*Georgetown.*
Tyler, Grafton	*do.*
Young, N.	*Washington.*

VIRGINIA.

Allen, B. W.	
Ashby, C. H.	*Culpepper C. H.*

Atkinson, Thomas P.	*Danville.*
Barr, S. B. F. C.	*Big Spring, Taylorsville.*
Bates, W. J.	*Wheeling.*
Belt, H. S.	*Pittsylvania.*
Bolton, James	*Richmond.*
Brooks, John N.	*do.*
Browne, O. A.	*Hicksford.*
Brown, P. F.	*Acowac.*
Burruss, J. L.	*Louisa C. H.*
Cabell, J. G.	*Richmond.*
Cabell, James L.	*University of Virginia.*
Carmichael, George F.	*Fredericksburg.*
Cochran, William B.	*Loudon Co.*
Coleman, J. C.	*Richmond.*
Cooke, A. T. M.	*Norfolk.*
Corbin, G. Lane	*Half-Way House, York Co.*
Cox, Thomas E.	*Richmond.*
Craghead, W. G.	*Danville.*
Creigh, Thomas	*Louisburg.*
Cunningham, Jno. A.	*Richmond.*
Dillon, A. S.	*Faronville.*
Dorset, J. L.	*Genito, Powhatan Co.*
Dove, James	*Richmond.*
Dove, Jno.	*do.*
Faunt Le Roy, John	*White Post, Clarke Co.*
Frissell, John	*Wheeling.*
Gibson, Charles Bell	*Richmond.*
†Gooch, P. Claiborne	*do.*
Hancock, F. W.	*do.*
Harrison, E. J.	*Cartersville P. O., Cumberland.*
Haskin, U. D.	*Richmond.*
Haxall, Robert W.	*do.*
Hildreth, E. A.	*Wheeling.*
Houston, M. H.	*do.*
Howard, Henry	*University of Virginia.*
Hurt, J. M.	*Halloway City.*
†Johnson, Carter P.	*Richmond.*
Johnson, James	*Hicksford.*
Joynes, Levin S.	*Richmond.*
Kemper, Charles R.	*Woodville, Rappahannock Co.*
Lake, R. P.	*Richmond.*

Lee, George	*Leesburg, Loudon Co.*
Lewis, T.	*King and Queen, Stevensville P. O.*
Little, John	*Richmond.*
Lumpkin, Jno. G.	*Hanover.*
Lyle, Jas.	*Prince Edward.*
Magill, Henry D.	*Leesburg.*
Mason, A. H.	*Falmouth.*
†Massie, H.	*Charlottsville.*
McElhenny, S. W.	*Wheeling.*
McGuire, Hugh H.	*Winchester.*
Meriwether, W. D.	*Richmond.*
Merritt, A. T. B.	*Richmond.*
Mettauer, J. P.	*Prince Edward C. H.*
Mills, Charles S.	*Richmond.*
Moore, W. J.	*Norfolk.*
Morrison, E. A.	*Lawrence.*
Moseley, W. P.	*Buckingham.*
Nicholson, G. L.	*Middlesex Co.*
Otis, George A.	*Richmond.*
Parker, W. W.	*do.*
Patrick, S.	*Kanawha C. H.*
Patteson, Samuel A.	*Manchester, Chesterfield.*
Patteson, W. A.	*Richmond.*
Payne, A. S.	*Paris, Fauquier Co.*
Peebles, J. F.	*Petersburg.*
Phillips, W. H.	*Richmond.*
Powell, H. B.	*Alexandria.*
Powell, J. F.	*Middleburg.*
Power, R. H.	*Yorktown.*
Quarles, Charles	*Mechanicsville, Louisa Co.*
Randolph, Robert C.	*Mellwood P. O., Clarke Co.*
Roddey, F. W.	*Richmond.*
Rogers, R. E.	*University of Virginia.*
Scott, Martin P.	*Richmond.*
†Selden, Henry	*Norfolk.*
Selden, William	*do.*
Silvester, R. W.	*do.*
Smith, J. W.	*Petersburg.*
Snead, Albert	*Richmond.*
Spencer, T. C.	*Petersburg.*
Spitler, Adam	*Buchanan, Upshire Co.*
Tabb, J. Prosser	*Gloucester Co.*

Taylor, Kidder R.	*Richmond.*
Terrill, G. F.	*Caroline Co.*
Thweatt, J. J.	*Petersburg.*
Trent, W. W.	*Richmond.*
Trent, P.	*do.*
†Trigg, Daniel	*Abingdon.*
Tucker, A. B.	*Winchester.*
Tucker, David H.	*Richmond.*
†Upshur, George L.	*Norfolk.*
Walke, J. Wistar	*Chesterfield.*
Walshe, Samuel	*Prince George Co.*
Wellford, Beverley R.	*Fredericksburg.*
Wellford, J. S.	*do.*
White, Luke	*Petersburg.*
Williman, A. R.	*Norfolk.*
Wilson, W. E.	*Richmond.*
Wilson, G. A.	*do.*
Wortham, A. G.	*do.*
Worsham, H. C.	*Dinwiddie.*
Yearby, George T.	*Eastville, Northampton.*

NORTH CAROLINA.

Belt, H. Singleton	*Winston, Forsyth C. H.*
Dewey, C. F.	*Goldsboro'.*
Dickson, J. H.	*Wilmington.*
Erwin, J. S.	*Marion.*
Jones, J. B.	*Chapel Hill.*
Mabrey, B. W.	*Tarboro'.*
Manson, O. F.	*Lynesville.*
Mercer, Jno. R.	*Tarborough.*
McKee, W. H.	*Raleigh.*
McKee, W. L.	*Morgantown, Burke Co.*
Myers, J. G. B.	*Washington.*
Norwood, Walter A.	*Hillsboro'.*
Pittman, Newson J.	*Rocky Mount.*
Thomas, Wm. Geo.	*Tarborough.*
Thomas, W. G.	*Wilmington.*
Thompson, Jno. R.	*Raleigh.*
Tull, J. G.	*Newbern.*
Warren, W. C.	*Edenton.*
Webb, William	*Hillsboro'.*

SOUTH CAROLINA.

Bailey, R. S.	*Charleston.*
Barker, Sandford W.	*do.*
Barratt, Jno. P.	*Abbeville.*
Bellinger, Jno.	*Charleston.*
Bradley, B. W.	*King's Tree, Williamsburg.*
Cain, D. J.	*Charleston.*
Clawson, C. L.	*Nation Ford.*
Coffin, Amory	*Aiken.*
Crane, Joseph S.	*Columbia.*
Dawson, J. L.	*Charleston.*
De Saussure, H. W.	*do.*
Dickson, Samuel Henry	*do.*
Elfe, Edward	*do.*
Elliott, Thomas A.	*Orangeburg.*
Fair, Samuel	*Columbia.*
†Flagg, Beling	*Charleston.*
Ford, Wm. H.	*do.*
Frost, Henry R.	*do.*
Gaillard, Peter C.	*do.*
Geddings, E.	*do.*
Geddings, J. F. M.	*do.*
Gibbes, N. H.	*St. Helena.*
Gibbs, Robt. W.	*Columbia.*
Goodwyn, T. J.	*Orangeburg.*
Happoldt, C.	*Charleston.*
Hazell, Andrew	*All Saints.*
Henderson, E. R.	*Blue House P. O.*
Holbrook, J. E.	*Charleston.*
Hook, J. H.	*St. Matthew's.*
Horlbeck, Elias	*Charleston.*
Horlbeck, W. C.	*do.*
Jervey, James P.	*do.*
Kinlock, R. A.	*do.*
Lebly, Robert	*do.*
Lynch, John	*Cheraw.*
May, Jno.	*St. George's P. O.*
Mayes, J. A.	*Maysville.*
McKain, Wiley J.	*Camden.*
Michel, R. F.	*Charleston.*

Michell, M.	*Charleston.*
Miller, W. C.	*Georgetown.*
†Mitchell, Edward	*Edisto.*
Mitchell, J. S.	*Charleston.*
Mobley, W. W.	*Lancasterville.*
Moore, M. S.	*Stateburg, Sumter Co.*
Moultrie, James	*Charleston.*
Moultrie, W. L.	*St. John's, Berkley.*
Muller, G.	*Lexington.*
Ogier, T. L.	*Charleston.*
Porcher, Francis Y.	*do.*
Porcher, F. Peyre	*do.*
Prioleau, J. Ford	*do.*
Prioleau, Thomas E.	*do.*
Purchin, F.	*do.*
Ravenel, St. Julien	*do.*
Ready, J. C.	*Edgefield.*
Robertson, F. M.	*Charleston.*
Robertson, T. S.	*Winsboro'.*
Rodrigues, B. A.	*Charleston.*
Saussure, H. W.	*do.*
†Simons, T. Y.	*do.*
Smith, Thomas	*Society Hill.*
Waring, Morton	*Black Oak.*
White, O.	*Charleston.*
Williams, Alexander	*Chesterfield.*
Winthrop, Henry	*Charleston.*
Wragg, William T.	*do.*

GEORGIA.

Arnold, Richard D.	*Savannah.*
Benson, J. W.	*do.*
Black, R. C.	*Augusta.*
Boring, Jesse	*La Grange.*
Brown, Pike	*Savannah.*
Bullock, W. Gaston	*do.*
Campbell, H. F.	*Augusta.*
Campbell, Robert	*do.*
Dugas, L. A.	*do.*
Eve, Joseph A.	*Augusta.*

Ford, L. D.	*Augusta.*
Garvin, J. P.	*do.*
Gilbert, J. C.	*Perry.*
Green, James N.	*Macon.*
Harris, Stephen N.	*Savannah.*
Harris, Juriah	*Augusta.*
Hofey, Thomas	*Columbus.*
Howard, J. Gordon	*Madison.*
Jones, W. B.	*Atlanta.*
Kollock, Phineas M.	*Savannah.*
Le Hardy, J. C.	*do.*
Logan, J. P.	*Atlanta.*
Means, A. H.	*Augusta.*
Moore, Richard D.	*Athens.*
Nottingham, C. B.	*Macon.*
Ogilby, Hugh J.	*Madison.*
Oliver, M. H.	*Atlanta.*
Padelford, Geo. P.	*Savannah.*
Phinizy, T. B.	*Augusta.*
Posey, John F.	*Savannah.*
Powell, Thos. S.	*Sparta.*
Powers, N. F.	*Harrison.*
Quintard, C. T.	*Roswell.*
Read, James B.	*Savannah.*
Richardson, C. P.	*do.*
Robertson, J. G.	*do.*
Ruffin, W. R.	*Augusta.*
Simmons, J. N.	*Griffin.*
Thompson, E. J.	*Augusta.*
Tufts, Johnson B.	*Savannah.*
Walton, C. R.	*Augusta.*

ALABAMA.

Alexander, Abm. F.	*Eutaw.*
Anderson, L. H.	*Sumterville.*
Anderson, W. H.	*Mobile.*
Blakey, Boling A.	*Montgomery.*
Boling, Wm. M.	*do.*
Boss, W. J.	*Stevenson.*
Cabell, P. H.	*Selma.*

Clanton, S. W.	*Warsaw.*
Cotnam, T. T.	*Stevenson.*
Cook, Jno. B.	*Bellefont.*
Dement, J. J.	*Meridianville.*
Denny, A.	*Suggsville.*
English, I. A.	*Cahaba.*
Gordon, F. E.	*Marion.*
Hargraves, J. T.	*Florence.*
Johnson W. B.	*Marion, Perry Co.*
Jones, Benjamin R.	*Montgomery.*
Leftwich, W. D.	*Huntsville.*
Lopez, A.	*Mobile.*
Malone, T. Stith	*Athens.*
Meriwether, G. M.	*Liné Creek.*
Miller, R.	*Mobile.*
Morris, J. Webb	*Courtland.*
Norris, G. D.	*New Market.*
Percival, C. F.	*Lowndes Co.*
Reese, W. P.	*Selma.*
Sowell, J. F.	*Athens.*
Thorton, Wm. H.	*Eufaula.*
Winn, P. C.	*New Berne.*

LOUISIANA.

Barton, Edward H.	*New Orleans.*
Beard, C.	*do.*
†Carpenter, William M.	*do.*
Fenner, E. D.	*do.*
†Harrison, J.	*do.*
Jones, James	*do.*
New, Robert A.	*Mansfield.*
Nott, G. A.	*New Orleans.*
Scruggs, S. O.	*Clantonville.*
Simonds, J. C.	*New Orleans.*

MISSISSIPPI.

Caise, J. S.	*Pontotoc.*
Divine, K. C.	*Sharon.*
†Grafton, Thomas J.	*Rodney.*

Keirn, G.	*Lexington, Holmes Co.*
Lowe, John T.	*Aberdeen.*
Shufford, F. B.	*Holly Springs.*

TENNESSEE.

Abernathy, J. J.	*Hockerville.*
Atchinson, T. A.	*Nashville.*
Avent, B. W.	*Murfreesborough.*
Baskette, W. T.	*do.*
Bethshares, H. H.	*Nashville.*
Bowling, W. K.	*do.*
Boyd, J. M.	*Knoxville.*
Brannock. J. M.	*McLemonsville.*
Buchanan, A. H.	*Nashville.*
Burford, J. S.	*Whiteville.*
Callander, Jno. H.	*Nashville.*
Cheatham, W. A.	*do.*
Childress, W. H.	*do.*
Clayton, H. H.	*Murfreesboro'.*
Clements, H. M.	*Clementsville.*
Clements, W. M.	*Gainsboro'.*
Cliff, D. B.	*Franklin.*
Conwell, Ira	*Nashville.*
Currey, R. O.	*Knoxville.*
Dabney, E. R.	*Clarksville.*
Dashiel, W. B.	*Shelbyville.*
Davis, P. W.	*Chapel Hill.*
Eppherson, J. P.	*Pulaski.*
Estill, Walace	*Winchester.*
Evans, R. F.	*Shelbyville.*
Eve, Paul F.	*Nashville.*
Ewing, Andrew B.	*Franklin.*
Ford, Jno. P.	*Nashville.*
Foster, R. C.	*do.*
Grant, George	*Memphis.*
Grant, Geo. R.	*do.*
Guthrie, C. B.	*do.*
Haggard, W. D.	*Gallatin.*
Harris, S. H.	*Nashville.*
Harris, Zeno	*Memphis.*

Haskins, E. B.	*Clarksville.*
Hoyte, Jas. W.	*Nashville.*
Illson, B. C.	*Lebanon.*
Jennings, Thos. R.	*Nashville.*
Johnston, J. L. C.	*Clarksville.*
Jones, W. P.	*Nashville.*
Kelly, John D.	*do.*
Kennedy, Thos. J.	*Cornersville.*
Lawrence, J. M.	*Nashville.*
Lenoir, B. B.	*Roane Co.*
Lindsley, J. B.	*Nashville.*
Lipscomb, Thomas	*Shelbyville.*
Litton, A.	*Nashville.*
Logue, J.	*Rural Hill.*
Long, J. A.	*Cantrel Cross Roads.*
McMurray, S. T.	*Spring Hill.*
McNutt, J. W.	*Kingston.*
Maddin, Thos. L.	*Nashville.*
Malone, H. B.	*Gallatin.*
Manlove, J. E.	*Nashville.*
Martin, Robert	*do.*
Mayfield, Geo. A. I.	*do.*
Mayfield, S. S.	*do.*
Millington, John	*Memphis.*
Moore, W. P.	*Mitchelville.*
Morton, Jno. H.	*Nashville.*
Murrell, T. C.	*Winchester.*
Owen, Richard	*Nashville.*
Park, Jno. S.	*Franklin.*
Perkins, N. C.	*do.*
†Porter, R. M.	*Nashville.*
Ransom, M.	*Murfreesboro'.*
Ramsey, Frank A.	*Knoxville.*
Rodgers, Jas.	*do.*
Senter, W. D.	*Hannas P. O.*
Smith, J. F.	*Somerville.*
Smith, Milo	*Chattanooga.*
Shanks, Lewis	*Memphis.*
Stockard, W. P.	*Mount Pleasant.*
Stroud, T. B.	*Gladeville.*
Thomas, N. L.	*Clarksville.*

Towns, J. F.	*Farmville.*
Watson, Jno. M.	*Nashville.*
Wharton, S. L.	*do.*
Whitaker, H. M.	*Clarksville.*
White, R. G. P.	*Pulaski.*
Winston, C. K.	*Nashville.*
Winston, Jno. D.	*do.*
Woodson, T. M.	*Hannas P. O., Sumner Co.*
Woodward, P. S.	*Nashville.*

KENTUCKY.

Almon, L. E.	*Underwood.*
Annan, Samuel	*Hopkinsville.*
Atchinson, W. A.	*Bowling Green.*
Baily, J. R.	*Russelville.*
Bell, T. S.	*Louisville.*
Bemiss, S. M.	*do.*
Blackburn, C. J.	*Covington.*
Bradford, J. T.	*Augusta.*
Breckinridge, R. J.	*Louisville.*
Bush, J. M.	*Lexington.*
Chambers, Wm. M.	*Covington.*
Chipley, W. S.	*Lexington.*
Cook, A. B.	*Louisville.*
Davis, E. G.	*Underwood.*
Edwards, R. A.	*Wallon, Boone Co.*
Evans, Asbury	*Covington.*
Fitch, G. N.	*Logan's Port.*
Fleming, Jno. T.	*Flemingbury.*
Flint, J. B.	*Louisville.*
Freeman, D. L.	*Floydsburg.*
Gaines, R. W.	*Hopkinsville.*
Holt, W. D.	*Covington.*
Johnston, J. C.	*Louisville.*
Lincoln, J.	*do.*
Mattingley, C. P.	*Bardstown.*
Miller, Henry H.	*Louisville.*
Moore, Thomas J.	*Harrodsburg.*
Norwood, Walter A.	*Henderson.*
Porter, L. C.	*Bowling Green.*

Powell, L.	*Louisville.*
Raphael, B. J.	*do.*
Ray, L. G.	*Paris, Bourbon Co.*
Singleton, J. W.	*Smithland.*
Spillman, C. H.	*Harrodsburg.*
Stevens, B. L.	*Union, Boone Co.*
Sutton, W. L.	*Georgetown.*
Thomson, D. D.	*Louisville.*
Wood, B. S.	*Trenton.*
Yandell, D. W. L.	*Louisville.*
Yandell, L. P.	*do.*

OHIO.

Armor, S. G.	*Cincinnati.*
Arons, Jno. J.	*do.*
Austin, A.	*Sandusky.*
†Awl, William M.	*Columbus.*
Ayres, A.	*Greenville.*
Baird, James M.	*Bourneville.*
Baker, Abraham H.	*Cincinnati.*
Baker, T. H.	*Wayne Co.*
Battles, W. S.	*Edinburg.*
Bigelow, J. M.	*Lancaster.*
Boerstler, G. H.	*do.*
Bonner, S.	*Cincinnati.*
Branson, Smith	*Chester Hill.*
Briggs, J. M.	*Marion.*
Brown, B. S.	*Bellefontaine.*
Buckner, Philip J.	*Georgetown.*
†Butterfield, J.	*Columbus.*
Carey, Abel	*Salem.*
Carey, Harvey G.	*Dayton.*
Carroll, Thomas	*Cincinnati.*
Carson, William	*Chillicothe.*
Carter, Francis	*Columbus.*
Charters, W. M.	*Lebanon, Warren Co.*
Clements, Joshua	*Dayton.*
Clendennin, William	*Cincinnati.*
Cochrane, Charles	*Sandusky.*
Colton, C. D.	*Marietta.*

Comegys, C. G.	*Cincinnati.*
Conklin, H. Smith	*Sidney, Shelby Co.*
Coons, Israel A.	*Dayton.*
Corson, J.	*Portsmouth.*
Cotton, J. D.	*Marietta.*
Cox, D. A.	*New Paris.*
Crews, James H.	*Upshur, Preble Co.*
Crume, Pliny M.	*Eaton, Preble Co.*
Dandridge, A. S.	*Cincinnati.*
Davis, F. H.	*Chillicothe.*
Dawson, Jno.	*Columbus.*
Delamater, Jacob J.	*Cleveland.*
Dodge, J. S.	*Cincinnati.*
Dorsey, G. Volney	*Piqua.*
†Drake, Daniel	*Cincinnati.*
Dunahoe, H. J.	*Sandusky.*
Dunlap, A.	*Ripley.*
Eaton, T. J.	*New Paris, Preble Co.*
Edwards, Thomas O.	*Cincinnati.*
Effinger, M.	*Lancaster.*
Ferris, O.	*Upper Sandusky.*
Ferris, S.	*New Westville.*
Fisher, Elias	*Waynesville, Warren Co.*
Ford, P. G.	*Cincinnati.*
Fries, George	*Hanovertown.*
Gard, J. N.	*Greenville.*
Gaston, Ephraim	*Morristown.*
Gillet, B.	*Springfield.*
Gordon, Thomas W.	*Georgetown.*
Grant, Charles	*Cincinnati.*
Griswold, L. D.	*Elyria.*
Grundy, Richard	*Columbus.*
†Harrison, John P.	*Cincinnati.*
Henderson, J. P.	*Newville.*
Heterick, A. B.	*Georgtown.*
Hills, Ralph	*Columbia.*
Holston, J. G. F.	*Zanesville.*
Howard, Richard L.	*Columbus.*
Huestis, Isaac	*Chester Hill.*
Hughes, C. B.	*Cincinnati.*
Hunt, Samuel P.	*Morrow, Warren Co.*

Hurxthal, Frederick T.	*Massillon.*
Janes, W. W.	*Toledo.*
Johnston, A. M.	*Cincinnati.*
Jones, C.	*West Union.*
Jones, W. W.	*Toledo.*
Judkins, David	*Cincinnati.*
Judkins, J. P.	*do.*
Judkins, William	*do.*
Koehne, H. F.	*Dayton.*
Kreider, M. Z.	*Lancaster.*
Lane, E. S.	*Sandusky.*
Langdon, O. M.	*Cincinnati.*
Lawson, L. M.	*do.*
Leonard, B. B.	*West Liberty.*
Mack, H. O.	*Shelby.*
Maggini, J. C.	*Fayetteville.*
Martin, Joshua	*Xenia.*
McArthur, J. W.	*Wilmington.*
McDermot, C.	*Dayton.*
McFarland, J. A.	*Tiffin City.*
McGrew, J. S.	*Montgomery, Hamilton Co.*
McIlvaine, R. R.	*Cincinnati.*
McMally, Thomas	*Chillicothe.*
McMeens, R. R.	*Sandusky.*
Mendenhall, George	*Cincinnati.*
Mitchell, G. F.	*Mansfield.*
Mosgrove, Jas. M.	*Urbana.*
Moxley, M. R.	*Wheelersburg.*
Moxley, N. K.	*Ironton.*
Munson, A. W.	*Kenton.*
Musgrave, H. B.	*Cincinnati.*
Musgrove, A.	*Urbana.*
Mussey, F. B.	*Cincinnati.*
Mussey, Reuben D.	*do.*
Neff, B.	*New Carlisle.*
†Norton, J. C.	*Marion.*
Norton, O. D.	*Cincinnati.*
Philips, W. H.	*Kenton.*
Potter, J. F.	*Cincinnati.*
Raymond, C. H.	*Cincinnati.*
Read, A. M.	*Norwalk.*

Richards, Wolcott	*Cincinnati.*
Rives, L. C.	*do.*
Robertson, C.	*McConnelsville.*
Robinson, J. D.	*Wooster, Wayne Co.*
Sachse, G. J.	*Lancaster.*
Safford, R.	*Putnam.*
Sams, C. C.	*Hillsborough.*
Sayles, J. A.	*Cleveland.*
Schenck, C. F.	*Columbus.*
Shenck, W. L.	*Franklin.*
Sheets, L. D.	*Dayton.*
Sheldon, B.	*Cleveland.*
Sibley, E. H.	*Lodi, Medina Co.*
Slusser, Lewis	*Canton.*
Smith, A. C.	*Medina C. H.*
Smith, Edwin	*Dayton.*
Smith, John A.	*Piqua.*
Smith, Samuel M.	*Columbus.*
Smith, S. Hanbury	*do.*
Spillman, Henry	*Medina.*
Steele, H. K.	*Dayton.*
Stevens, Joshua	*Lebanon.*
St. John, Samuel	*Cleveland.*
Strader, D. P.	*Cincinnati.*
Taggart, W. W.	*Smithville, Wayne Co.*
Taliaferro, W. I.	*Cincinnati.*
Tappan, B.	*Steubenville.*
Taylor, James	*Cincinnati.*
Thompson, J. B.	*Columbus.*
Thompson, R.	*do.*
Tilden, D.	*Sandusky, Erie Co.*
Trevitt, Wm.	*Columbus.*
Tweed, T. M.	*Eckmansville.*
Updegraff, J. T.	*Mount Pleasant.*
Vanharlingen, I.	*Lebanon.*
Vattier, J. L.	*Cincinnati.*
Walker, J. P.	*do.*
Waterman, L. D.	*do.*
West, Henry	*Clairsville, Belmont Co.*
White, James	*Lancaster.*
White, John F.	*Cincinnati.*

White, J. W.	*Stockport.*
Williams, I. C.	*Bloomington.*
Wood, Thomas	*Cincinnati.*
Woodward, Charles	*do.*
Wright, James	*Belmont.*
Wright, M. B.	*Cincinnati.*

INDIANA.

Ayers, H. P.	*Fort Wayne.*
Boyd, S. S.	*Jacksonburg.*
Brelsford, Joseph	*Plymouth.*
Bullard, Talbot	*Indianapolis.*
Byford, W. H.	*Evansville.*
Cameron, R. A.	*Valparaiso.*
Clapp, A.	*New Albany.*
Clapp, W. A.	*do.*
Darnall, M. D.	*Bainbridge.*
Dicken, James L.	*Somerset.*
Dickey, William	*Dalton.*
Florrer, T. W.	*Alamo.*
Haymond, R.	*Brookville.*
Hitt, W. W.	*Vincennes.*
Holt, Willis W.	*do.*
Horne, S. S.	*Marion.*
Humphries, Lewis	*South Bend.*
Hutchinson, David	*Mooresville.*
John, H. V. V.	*Indianapolis.*
Johnson, Nathan	*Cambridge City, Wayne Co.*
Kersey, Vierling	*Milton.*
Latta, Milton M.	*Goshen.*
Leedy, J. K.	*Warsaw, Kosciusko Co.*
Leonard, S. E.	*New Albany.*
Lomax, William	*Marion.*
Lyons, W. B.	*Huntington.*
Martin, William H.	*Rushville.*
Maclean, George M.	*New Albany.*
Mears, G. W.	*Indianapolis.*
Mendenhall, Isaac	*Ashland, Henry Co.*
Meeker, David	*Laport.*
Meekes, D.	*Laport.*

Morgan, Daniel	*Evansville.*
†Mothersett, I. L.	*Indianapolis.*
Mullen, Alexander J.	*Napoleon, Ripley Co.*
Murphy, Edward	*New Harmony, Posey Co.*
Parry, Charles	*Indianapolis.*
Patterson, R. J.	*do.*
Pennington, Joel	*Milton, Wayne Co.*
Ronalds, Hugh	*Evansville.*
Rose, Landon C.	*Laporte.*
Sarber, W. E.	*Palestine.*
Sexton, H. G.	*Rushville.*
Sheets, L. D.	*Liberty.*
Shively, James S.	*Marion, Grant Co.*
Sommes, Joseph	*Vincennes.*
Sutton, George	*Aurora.*
Town, R. R.	*New Albany.*
West, Calvin	*Hagerstown.*
Winton, Wm. R.	*Wabash.*
Woodworth, B. S.	*Fort Wayne.*

ILLINOIS.

Adams, Nichols	*Quincy.*
Allen, George T.	*Marine.*
Andrews, E.	*Chicago.*
Bailey, F. K.	*Joliet, Will Co.*
Baldwin, S. Y.	*Decatur.*
Bane, Wm. M.	*Payson.*
Banks, E. C.	*Charleston.*
Blaney, J. V. Z.	*Chicago.*
Bloodgood, James	*do.*
Brainard, Daniel	*do.*
Bridges, V. R.	*Salsbury.*
Bunce, James	*Galesbury.*
Clark, Charles W.	*Rockford.*
Colburn, E. M.	*Peoria.*
Coolidge, Charles	*Warsaw.*
Cooper, E. S.	*Peoria.*
Coopins, P. G.	*Fairweather.*
Crothers, E. K.	*Bloomington.*
Davis, N. S.	*Chicago.*

Davis, Wm. H.	*La Salle.*
Dickinson, Edward	*Peoria.*
Edmiston, T. K.	*Clinton.*
Edwards, Willis G.	*Alton.*
Evans, John	*Chicago.*
Everett, S. W.	*Quincy.*
Fitch, T. D.	*Kewanee.*
Freer, J. W.	*Chicago.*
Frye, Joseph C.	*Peoria.*
Golleday, H. P.	*Lacon.*
Goodbrake, C.	*Clinton.*
Gregg, P.	*Rock Island.*
Hall, Geo. W.	*Carthage.*
Hamilton, Wm. R.	*Peoria.*
Harriman, H. C.	*Jerseyville.*
Hard, C.	*Ottawa.*
Harrington, W. C.	*Payson.*
Herrick, W. B.	*Chicago.*
Herrick, Josiah B.	*Vandalia.*
Hillis, Wm. A.	*Hillsboro'.*
Hinsey, Jos. C.	*Pekin.*
Hobbs, J. C. H.	*Galena.*
Hollester, J. H.	*Chicago.*
King, Joseph	*Decatur.*
Kirwan, P.	*Ottawa.*
Knox, Wm. A.	*Rock Island.*
Lewis, B. S.	*De Witt.*
Long, S.	*Springfield.*
Luce, A. H.	*Bloomington.*
Maus, Jos. S.	*Perkin.*
Maus, W. S.	*do.*
McArthur, A. S.	*Joliet.*
Miller, De Laskie	*Chicago.*
Nance, Hiram	*Lafayette.*
Noble, H.	*Bloomington.*
Noble, S. W.	*Le Roy.*
Paddock, S. A.	*Princeton.*
Palmer, A. B.	*Chicago.*
Parker, Henry	*do.*
Prince, David	*Jacksonville.*
Quigley, W. C.	*Chicago.*

Ralston, J. W.	*Quincy.*
Robinson, W.	*Dover.*
Rogers, T. P.	*Bloomington.*
Rouse, Rudolphus	*Peoria.*
Shepherd, M.	*Payson, Adams Co.*
Skelling, David	*Winchester.*
Smith, H. M.	*Vincennes.*
Stahl, Daniel	*Quincy.*
Steele, James M.	*Grandview.*
Stout, Joseph	*Ottawa.*
Stipp, George W.	*Bloomington.*
Thompson, Samuel	*Albion, Edwards Co.*
Trowbridge, S. J.	*Decatur.*
Varien, Wm.	*Chicago.*
Washburn, Thomas	*Lawrenceville.*
Welch, Wm. W.	*La Salle.*
Williams, Hezekiah	*Alton.*
Wood, Wm.	*Cairo.*

MISSOURI.

Adison, Stephen	*St. Louis.*
Alleyne, J. S. B.	*do.*
Alexander, John B.	*Lexington.*
Athurson, J. F.	*do.*
Baines, Jno.	*St. Louis.*
Barrel, R. T.	*do.*
Baumgarten, Fred. E.	*do.*
Chandler, Chas. Quarles	*Rockfort.*
Clarke, R.	*St. Louis.*
Coons, A. J.	*do.*
Cooper, D. M.	*do.*
Currie, Wm.	*Jefferson City.*
Edgar, Wm. S.	*St. Louis.*
Engleman, George	*do.*
Frazer, E. S.	*do.*
Golding, Walter S.	*do.*
Hartt, George C.	*Booneville.*
Hempstead, C. W.	*St. Louis.*
Holmes, R. S.	*do.*
Johnson, George	*do.*

Johnson, John B.	*St. Louis.*
Johnson, Richard P.	*do.*
Lemoine, E. S.	*do.*
Lewis, R. K.	*Huntsville.*
Magoffin, John	*St. Louis.*
Massie, T. E.	*do.*
McDowell, Joseph	*do.*
McMurray, John H.	*Independence.*
McPheeters, Wm. M.	*St. Louis.*
Meade, D. E.	*do.*
Moore, John S.	*do.*
Moses, S. Gratz	*do.*
Perry, L. P.	*do.*
Peur, George	*Fee-fee.*
Pollak, S.	*St. Louis.*
Pope, Charles A.	*do.*
†Reyburn, Thomas	*do.*
Reynolds, J. W.	*Fort William.*
Riley, A. A.	*Fulton.*
Schaenrick, H.	*St. Louis.*
Shoemacher, Hammond	*Milwood.*
Scott, J. W.	*St. Louis.*
Smith, J. D.	*Fayette.*
Smith, E. F.	*St. Louis.*
Stevens, C. W.	*do.*
Tandy, D. C.	*do.*
Vaughn, Isaac P.	*Glasgow.*
Walker, George S.	*St. Louis.*
Washington, James R.	*do.*
Welborn, John C.	*Frankford.*
Wilson, J. W.	*St. Louis.*
Wislizénus, Adolphus	*do.*
Woodson, John C.	*Spencerburg.*

ARKANSAS.

Armstrong, F. W.	*Pine Bluff.*
F. Grundy McGavoch,	*Pecan-Point.*

MICHIGAN.

Allen, J.	*Ann Arbor.*
Andrews, J.	*Pawpaw.*
Arnold, S. R.	*Monro.*
Axford, S. M.	*Flint.*
Barnum, B.	*Schoolcraft.*
Beech, J. H.	*Coldwater.*
Brodie, Wm.	*Detroit.*
Brown, J. A.	*do.*
Christian, E. P.	*do.*
Clapp, H. C.	*Pawpaw.*
Cobb, H. P.	*Detroit.*
Cobb, L. H.	*do.*
Cone, E. D.	*Hillsdale.*
Cox, Edward	*Battle Creek.*
Davenport, Lewis	*Detroit.*
Denton, S.	*Ann Arbor.*
Douglass, S. H.	*do.*
Durton, Samuel	*do.*
Fanner, C. P.	*do.*
French, S. B.	*Battle Creek.*
Gorton, J. C.	*Detroit.*
Gunn, Moses	*do.*
Haze, W. H.	*Farmington.*
Inglis, R.	*Detroit.*
Johnson, G. K.	*Pontiac.*
Kibbie, J.	*Port Huron.*
Kinney, M. C.	*Lapeer.*
Klein, P.	*Detroit.*
Leasia, J. A.	*Williamston.*
Leland, A. L.	*Detroit.*
Leete, Albert E.	*Romeo.*
Leach, E.	*Owassa.*
McCollom, C.	*Romeo.*
Murray, Andrew	*Niles.*
Nims, Dwight	*Homer.*
Paddach, J.	*Pontiac.*
Palmer, A. B.	*Detroit.*
Patterson, M. A.	*Tecumseh.*
Pierce, James L.	*Corunna.*

Pitcher, Zina	*Detroit.*
Platt, A.	*Grand Rapids.*
Potter, A. O.	*Ann Arbor.*
Rice, R. S.	*Detroit.*
Robinson, L. G.	*do.*
Russell, Geo. B.	*do.*
Sager, A.	*Ann Arbor.*
Seely, T. P.	*do.*
Shepard, Charles	*Grand Rapids.*
Stebbins, N. D.	*Detroit.*
Storm, A. R.	*Almont.*
Stockwell, C. M.	*Port Huron.*
Stewart, Morse	*Detroit.*
Stone, A. R.	*Almonte.*
Smith, J. S.	*Armada.*
Tompkins, L. D.	*Cassapolis.*
Tanner, C. P.	*Ann Arbor.*
Taylor, Hen.	*Mount Clemens.*
Tillson, Philo	*Romeo.*
Tripler, C. S.	*Detroit.*
Wells, B. P.	*Niles.*
Wells, E.	*Ann Arbor.*
White, John B.	*Saginaw.*

IOWA.

Adler, John	*Davenport.*
Armour, Samuel G.	*Keokuk.*
Arnold, Edward A.	*Davenport.*
Elbert, Jno. D.	*Keosauqua, Van Buren Co.*
Ely, Jno. F.	*Cedar Rapids.*
Ford, E. R.	*Keokuk.*
Francis, E. C.	*do.*
Horr, Asa	*Dubuque.*
Hughes, J. C.	*Keokuk.*
Lewis, R. S.	*Dubuque.*
Lyons, W. B.	*Huntington.*
Malcolm, A. B.	*Dubuque.*
McGugin, D. L.	*Keokuk.*
Rauch, J. H.	*Burlington.*
Sanborn, J. E.	*Keokuk.*

Sanford, John F.	*Keokuk.*
Siveter, Thomas	*Salem.*
Van Patten, N.	*Davenport.*
White, J. W.	*Stockport.*
Watson, Wm.	*Dubuque.*

WISCONSIN.

Ayres, D. Cooper	*Green Bay.*
Bartlett, John K.	*Milwaukee.*
Brisbane, W. Henry	*Arena.*
Brown, J. J.	*Madison.*
Castleman, A. L.	*Delafield.*
Chapman, C. B.	*Madison.*
Douseman, John B.	*Milwaukee.*
Ford, J. D.	*Winona.*
McKinley, Hays	*Kenosha.*
Pease, C. G.	*Janesville.*
Thorn, Samuel S.	*Milwaukee.*
Wilbur, George	*Mineral Point.*

MINNESOTA TERRITORY.

Le Bontillier, C. W.	*St. Anthony.*
Murphy, John	*do.*
Potts, Thomas R.	*St. Paul.*

CHEROKEE NATION.

Ross, R. D.	*Grand Sabine.*

UNITED STATES ARMY.

Cuyler, J. M.	Moses, Israel
McLaren, A. N.	Porter, J. B.
	Tripler, Chas.

UNITED STATES NAVY.

Barrington, Samuel	Horner, G. R. B.
Delany, M. G.	Lockwood, John
Dillard, T.	Pinkney, Ninian
Greene, J. M.	Wood, W. Maxwell.

FOREIGN.

W. F. Atlee,
A. J. Semmes,
R. R. McIlvaine,
W. H. Berry,
N. J. Pittman,

} Delegates from the *American Medical Society in Paris.*

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